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THE MOST MAGNIFICENT CITY HALL IN THE WORLD.

Thirty Years in Construction—Will Cost More Than $25,000,000 Before it is Finished—Largest Clock Ever Made. —Run by Compressed Air.

ON the first day of the present month the City Hall of Philadelphia was formally turned over to the Chief Executive of the city, in accordance with a special act of the Legislature. The act which created the Building Commission, in whose charge the construction of the City Hall has been entrusted until the present time, was passed August 5, 1870. Up to date the expenditures have amounted to $24,306,058.25, and the end is not yet. It is more than likely that the amount will exceed twenty-five millions before the building is fully completed. For practical purposes the work is finished, for most of the floor space is now occupied, even though some of the rooms are not finished. While the discharge of the Commission and turning over of the unfinished work to the city administration is in harmony with the principles laid down in the Bullitt Bill, by which the new charter is known, inasmuch as it places the responsibility with the Mayor, nevertheless it is looked upon with suspicion by many citizens.

PHILADELPHIA'S CITY HALL.

THE SITE SELECTED BY THE FOUNDER.

When, in 1681, William Penn marked out the plan for the city, one of his first acts was to provide a site for the future town hall of the "pleasant country town," which he named Philadelphia. At the intersection of High, now Market street, and the fourteenth street from the Delaware river, now Broad street, the founder designated the plat, formerly known as Centre Square, but now called Penn Square, as the site for the then future public building. More than a century elapsed before anything was done looking to the realization of the founder's thought. Some effort was made in 1842 toward the consummation of the original plan, but the project hung fire until 1860, when several designs were prepared only to fail, owing to the commencement of the Civil War. At the close of the war the matter was considered once more and an architect selected from a list of seventeen competitors, but the site was changed to Independence Square. This roused such earnest opposition that it only tended to the completion of the original idea, and, accordingly, an act was passed by the Legislature in 1870 creating the building commission. The act gave the voters the privilege of deciding the location of the proposed new City Hall, and Penn Square was chosen in preference to Washington Square by a majority of 18,800 out of a total of 84,450.

WORK COMMENCED IN 1871.

The first actual work was performed in January, 1871, and in the following August ground was formally broken by the president of the commission.

The first stone was laid just a year from that date, and the corner stone was placed in position in the northeast angle May 7, 1887, on the tower at the southwest angle, 337 feet and four and one-half inches from the ground. It is the

LARGEST CITY HALL IN THE WORLD.

It is difficult to realize how large it is, but a tolerably correct idea may be formed by a glance at the following dimensions:

Length from north to south	486	feet 6 inches
Length from east to west	470	feet
Length of each front across corner pavilions	428	feet
Area	4½	acres
Total area of floor space	14½	acres
Height of tower from ground level	547	feet 11¼ inches
Height of tower from footings	571	feet 5¼ inches
Width of tower at base	90	feet
Width of tower foundation at footings	100	feet
Height from ground to centre of clock dial	361	feet 1½ inches
Diameter of clock dial across frame	26	feet
Total number of rooms	634	

COMPARED WITH OTHER HIGH BUILDINGS.

Washington Monument	550	feet
City Hall, Philadelphia	547	" 11¼ inches
Cologne Cathedral	510	"
Great Pyramid	480	"
Strasburg Cathedral	468	"
St. Peters' Rome	448	"
St. Stephen's Cathedral, Vienna	441	"
Salisbury Cathedral	404	"
Toraccio of Cremona	396	"
Frieburg Cathedral	385	"
Amiens Cathedral	383	"
Church of St. Peter's, Hamburg	380	"
The Cathedral, Florence	376	"
Hotel de Ville, Brussels	374	"
Torre Asinelli, Bologne	370	"
St. Paul's, London	360	"
Church of St. Isaac, St. Petersburg	336	"
Cathedral, Frankfort-on-the-Main	326	"
Bell Tower, St. Mark's, Venice	323	"
Hotel des Invalides, Paris	310	"
United States Capitol, Washington	287	"
Masonic Temple, Philadelphia	240	"

MATERIALS USED IN ITS CONSTRUCTION.

As indicating the magnitude of the work the following are a portion of the materials used in the construction of the building:

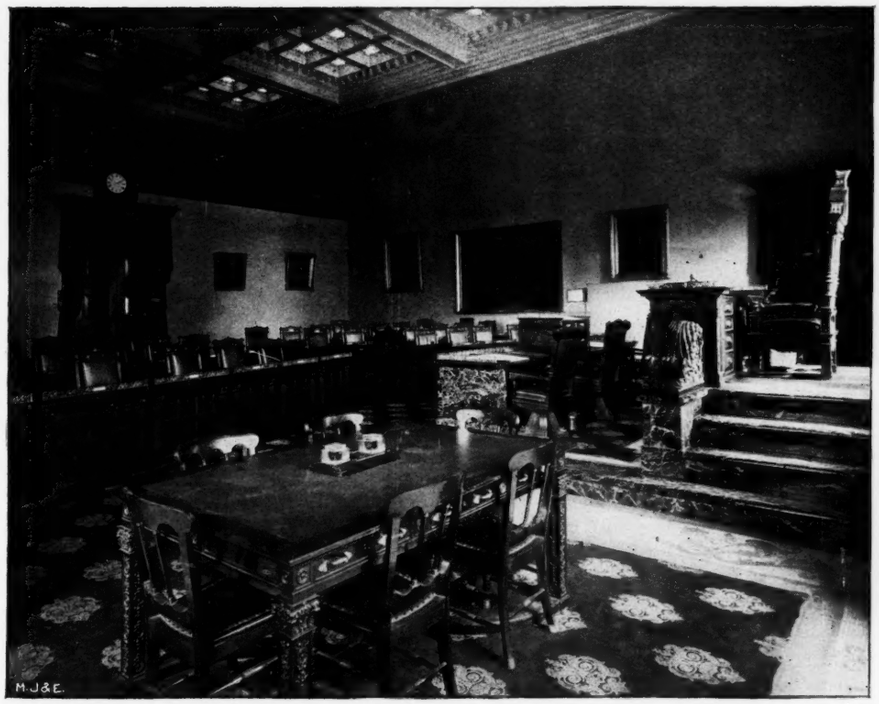
Excavations	141,500	cubic yards
Concrete foundations	20,000	do
Foundation stone in walls	636,000	do
Dressed granite, exterior	98,000	do
Dressed marble, exterior	730,000	do
Dressed sandstone, interior	50,000	do
Wrought and cast iron, all kinds	27,000	do
Hard bricks	80,000,000	do
Pressed and enameled bricks	300,000	do
Bordering slate	80,000	square feet
Bronze work, all kinds	371,346	pounds

The building is supplied with water by a separate line of water mains, twelve inches in diameter, nearly three miles in length. More than half a million gallons are consumed every twenty-four hours.

IT AFFECTS MODERN FRENCH RENAISSANCE

in style of architecture. The four fronts are similar in design. In the centre of each, an entrance pavilion of ninety feet in width rises to the height of more than 200 feet, having receding wings of 128 feet elevation. The fronts terminate at the four corners with towers or pavilions of fifty-one feet square at base and 161 feet high.

MAYOR'S RECEPTION ROOM—PHILADELPHIA CITY HALL.



SELECT COUNCIL CHAMBER—PHILADELPHIA CITY HALL.

The whole exterior is bold and effective in outline, and elaborated with columns, pilasters, pediments, cornices, enriched windows and other appropriate adornments. Centre archways, eighteen feet in width and thirty-six feet in height, in each of the four central pavilions, constitute the four principal entrances, affording passageways for pedestrians up and down Broad and Market streets.

In the centre of the group a courtyard of 200 by 220 feet affords light and air to all the adjacent portions of the building. From the north side of this space rises the tower, 547 feet 11¼ inches from the ground lines and 571 feet 5¼ inches from foundations, forming a prominent feature of the city from whatever point it may be approached, as Saint Peter's is of Rome and Saint Paul's is of London. The foundations of the tower are laid on a bed of solid concrete, 100 feet square, eight feet six inches thick, at the depth of twenty-three feet six inches below the surface of the ground; and its walls, twenty-two feet in thickness, are built of dressed dimension stones, weighing from two to five tons each.

The tower is ninety feet square at the base, falling off at the upper stages until, at the spring of the dome, it becomes an octagon fifty feet in diameter. A statue of the founder of Pennsylvania, thirty-seven feet in height, crowns the structure, and completes the extraordinary altitude of 547 feet 11¼ inches, making it the highest tower in the world.

MAGNIFICENT INTERIORS.

The structure, which is as near fireproof as human skill can make it, contains 634 rooms, giving ample provision for the accommodation of the courts and for all municipal departments, as well as a number of surplus rooms for use in the classification and preservation of the archives of the city, for storage and for increased accommodations, which will undoubtedly be required by the natural increase of the public business, and the accumulation of the public records. The interior is finished in the most magnificent style, without regard to the expense, as a glance at some of the interior views will show.

MODERN OFFICE EQUIPMENT.

The building is equipped throughout with the most modern document files, blank drawers, and so forth, all in steel. Besides, the outfit includes counters and screens, roller and flat top desks, tables and every conceivable device for the proper filing and preservation of valuable public records. Half a million dollars were expended in this building for these fixtures.

TWENTY ELEVATORS IN USE.

There are twenty elevators in constant use, for passenger service, besides the one in the tower, located at the corners of the leading corridors, so as to facilitate the intercourse with the public offices, courts and other branches of the government located in the various floors. In addition to these means of approach there are large stairways in the four corner pavilions, and a staircase in the centre pavilions on the north, south and east fronts.

THE LARGEST CLOCK IN THE WORLD.

The tower of the City Hall was designed for a clock, but, owing to its extreme height and the size of the dial face, problems were presented never before encountered in the installation of a tower clock. The contract for the installation of this clock was let in September, 1898. The work was completed the first of the following December, and at midnight on the 31st of December, 1898, the clock commenced keeping accurate time. The diameters of the dial openings are twenty-five feet, including the rim. The height is so great that the dials

SUPREME COURT ROOM—PHILADELPHIA CITY HALL.

COMMON COUNCIL CHAMBER—PHILADELPHIA CITY HALL.

are often obscured by clouds, and during the erection of the clock the ironwork was frequently wet with deposited moisture while the pedestrians below were in a dry atmosphere. When only moderate breezes blow in the street, a gale is experienced at the clock dials. The tower up to the level of the clock dials is built faced with marble, but the upper 200 feet is constructed of iron electro-galvanized with aluminum. The tower, of course, is unsupported above the roof of the main building. The top of the tower has a small diurnal motion accompanying that of the sun and owing to the expansion of that portion of the tower upon which the sunshine falls. All of these conditions made the installation of a tower clock of such prominence (which of course must be accurate) practically impossible, if built as a primary clock.

RUN BY COMPRESSED AIR.

The pneumatic system, as applied to tower clocks, represents the latest development in the art of clock installation, and is a striking illustration of the production of great efforts by small increments of energy. As its name indicates, the motive power is compressed air, the mechanism being divided into four distinct parts, viz., the air compressor, the master clock, the dials and the dial mechanism.

The master clock, the controlling factor of the entire plant, together with the auxiliary clock, is located in a large metallic and glazed case at the southwest corner of the seventh floor of the tower; the case is built upon girders built into the walls of the tower, floored with white marble and the walls tiled. The case is not connected with the floor, and is therefore entirely free from vibration. The case is also air-tight and dust-proof. The master clock is as perfect as is possible to make; the movement, hand-made and jewelled throughout, required two years to produce it. The auxiliary clock is also of fine workmanship. Heavy cast-iron pedestals form the lower cases of the clocks, their office being to act as a magnetic shield to the steel pendulums. The master clock is wound once in thirty days, the auxiliary clock once every eight days. To wind, the key is inserted through a hole in the glass panels of the case immediately in front of the clock faces, the openings being closed by rubber plugs. Care is observed in maintaining uniform temperature within the case. A pneumatic thermostat on the back wall within the case controls an electric heater, thus insuring no greater variation than two degrees throughout the entire year. Both clocks are of the pendulum type, and both are guaranteed to keep time within ten seconds a week error.

Considered from a utilitarian standpoint, the building is unique; no other structure in the world contains within its four walls the entire machinery of so complex a municipal organization. With the single exception of the Parliament House at London, the Philadelphia City Hall is the largest public building in the world. Numerous royal palaces exceed it in ground area, but in no structure have the elements for safety of records and convenience of access been more carefully considered.

GOVERNMENT FOR A CITY OF 12,000.

ONE of the most delightful of the New Jersey suburbs of New York is Morristown. It is located less than thirty miles from the metropolis, surrounded by lofty hills and has itself an elevation which insures good air and perfect freedom from that bane of many less fortunately located cities, malaria. Many New Yorkers, prominent in the worlds of finance, literature and art, have made their homes there, and there is probably no town of 12,000 inhabitants in the world which can boast as many magnificent suburban residences. The historical associations of Morristown, filled as it is with relics of Washington's memorable New Jersey campaign, give it an interest which would alone suffice to draw attention to it. Recently, however, Morristown has taken another attraction, viz., a mayor, who is a Doctor of Divinity, and who for many years was prominent as a religious worker in New York City. Dr. Fox has proved himself quite as good in the mayor's chair as in the pulpit and the record which appeared in the report presented to the Board of Aldermen recently is a good sermon on municipal fidelity, efficiency and enterprise.

It is interesting to know the appropriations regarded necessary for a city of 12,000 population of the character of Morristown, and they are as follows: Streets, $13,760; fire department, $7,000; street lamps, $9,500; printing, $1,500; police department, $8,000; sewerage, $1.000.

That economy is not practiced at the expense of the public servants will be seen from the fact that the salaries of all the members of the police force were raised from $60 to $160 per year. The salary list at present is as follows:

Collector, $1,250; assessor, $900; chief of police, $1,000; street commissioner, $720; police sergeant, $780; roundsman or patrolman, $720; treasurer, $500; health inspector, $350; clerk, $300; chief engineer, $120; surveyor, $100; counsel, $100; police surgeon, $100; overseer of the poor, $50.

The assessed value of taxable real estate in the town is $6,601,400 and of personal property, $1,467,200; a total of $8,068,600. The rate of taxation the past year on each hundred dollars was $1.90.

The license fees collected from various businesses form no inconsiderable portion of Morristown's resources. From liquor dealers was gathered last year a net amount of $5,420. The hackmen, about forty in number, are charged $5 each. Licenses must be paid for by each show that exhibits in town; also by each billiard room; also by auctioneers, hucksters and junkmen, bootblacks and organ grinders. The telephone company pays $50 a mile for the right of way of its underground conduit, 6.7 miles in length.

It will be seen that, like a prudent husbandman, Morristown leaves no gleanings in the field. The officials are equally careful in expenditures. Mayor and aldermen receive no pay and the chairman of committees often make, gratis, outlays of time and energy in work for their city which, if made in their own callings, would afford them considerable profit.

UNIVERSITY INSTRUCTION IN MUNICIPAL GOVERNMENT.

First Course on Municipal Affairs Established in University of Pennsylvania—Other American Institutions of Learning Follow Suit—Too Much Attention Given to Theoretical Government—Monographs on Leading Questions Needed.

BY JAMES T. YOUNG, PH. D.*

JAMES T. YOUNG.

THE necessity for university instruction in municipal affairs has received tardy recognition in most modern countries. When in 1894 the first American lectureship on municipal government was established at the University of Pennsylvania, under the direction of Professor L. S. Rowe, the subject had been treated in only a few books on government, and was generally regarded as an unknown and forbidden field. The consensus of opinion at that time was admirably summed up in Mr. Bryce's well known sentence, "The government of cities is the one conspicuous failure of the United States." Nor is the subject given that attention even at the present time which its importance warrants. The statistical results contained in the valuable and interesting report of the committee are somewhat flattering. The distinguished chairman of the committee has pointed out that many colleges returned answers stating that they had separate courses on municipal government when there was reason to suspect that the expression "course in municipal government" had been most liberally used. Yet separate courses dealing with municipal affairs are necessary if we are to secure for the subject a fair and adequate share of public attention. At the present time the various studies which make up the college curriculum are in a state of keen competition with each other, and so long as we are content to see city conditions discussed incidentally as a subordinate part of a general course on government, we need expect no great development of municipal studies. What is most needed at present is the endowment of special chairs or lectureships on this subject.

When we consider the proportion of political, administrative, economic and social questions which have their foundation in city life, and which are inextricably bound up with distinctly urban conditions, it must be confessed that the relative importance of courses upon municipal affairs has not been realized. Let us take, for example, half a dozen modern questions at random in the fields named, questions which are in the forefront of public discussion at the present time, such as public charities, public health, transportation, or the various questions which are gathered together under the labor problem. Here we have philanthropy, administrative organization, medical science and general economics all represented, yet each one of the questions named arises from, and must find its solution in a distinctively urban environment. We have courses in sociology in nearly all our colleges and universities, courses in economics, in government and administration and in finance. Why not devote at least one special and distinct course to that set of conditions which lies at the foundation of so many of the problems dealt with under the other departments.

TOO LITTLE CONSIDERATION GIVEN TO SOCIOLOGICAL STUDY.

A second thought suggested by the returns from our colleges in answer to the committee's circular is that we have devoted our attention too exclusively to government, to mere administrative machinery. We have divorced the mechanism of city government too much from the social and economic conditions underlying it, and have given too little study to the fundamental aspects of municipal life. In our anxiety to learn the details of municipal administration, we are in danger of neglecting the objects of administration. Is it conceivable that any one should study intelligently all the intricate parts of a machine without first understanding clearly the purposes for which it is used? Should we not lay special emphasis upon the peculiar conditions of modern city life, even at the risk of neglecting the description of some detail of administrative machinery?

To be more explicit in the statement of our present tendency, it may be said that we lay great emphasis upon the central fact in modern municipal organization—the concentration of power in the hands of the mayor. We mention, in passing, that this is caused by the demand for a more definite responsibility and then we proceed to the detailed study of this peculiar system or organization. But on examination it must be evident that this concentration of power is intimately bound up with certain fundamental conditions of modern urban life. We find that every organization, whether it be church or sporting club, requires a certain fund of energy to run the machinery of its government. If all the members can contribute a small amount of energy and attention the governmental power is divided rather evenly among the members. If anything occurs to diminish the available quota of time given by each member, then a concentration of power in the hands of a few is inevitable. The less the interest of members, the greater the concentration of power necessary. Furthermore, the amount of power devolving upon the association influences directly the degree of concentration in the government. If the functions are comparatively limited the government is likely to be democratic in substance; but if the powers increase to such an extent as to make it impossible for the individual members to carry on or supervise directly the business of the organization, the concentration of power in the hands of the few again results.

Now these principles are seen in the operation of business corporations, clubs and associations as well as in political governments of whatever description. If anything occurs to diminish the amount of time which citizens will spend upon city government, or to increase the functions of the city beyond the control of its citizens we may expect a concentration of power. It is, therefore, of the highest importance in studying municipal government to consider not alone the fact of concentration, but to discover what the conditions are which attract the citizen's attention away from politics and lessen his interest in governmental affairs. If these forces be permanent in their character, then we may expect a permanent change in the organization of our governments. If the forces are only temporary, then we may diagnose the conditions with entirely different results.

HOME VS. STATE RULE.

Another example of the exclusive attention paid to the mere machinery of municipal government is seen in our discussions of Municipal Home Rule. The question of how far our cities should be controlled by the State administration is a highly complex one. It involves the additional inquiry, Which branches of city government should be subject to State control? Should it be the schools, the police, the health bureau, the franchise-granting power, the finances, the method of accounting, the street-paving or the elections? In nearly all of these we already have State legislation, but the question is, shall State administrative officials supervise the city's activity along these lines? The solution of this problem can only be secured after a most careful examination of the influence which the city exerts upon the State at large. In the measure that the education, the health and the crime of the city reach out beyond the

* Of the University of Pennsylvania, Philadelphia. This paper was read before the Rochester meeting of the National Municipal League, in May, 1901.

municipal limits and directly affect the conditions of the surrounding country, just in the same measure should the State administration be in a position to control city conditions or to hold the city authorities up to a fixed standard of efficiency. In the arrangement of our municipal studies we should, therefore, pay particular attention to the powerful, one might almost say the controlling influence exerted by the city upon the State as a whole. Every agency of city influence, whether it be a surburban trolley road or a daily newspaper should be carefully studied in its relation to this question. We shall then be in a position to consider intelligently the arrangement of administrative machinery best adapted for State control.

In brief, we should devote more and more study to those peculiar economic conditions in our cities which so directly influence the thought of the people respecting government. In this connection it is highly important for such an organization as the National Municipal League to encourage by every means in its power the investigation of the economic basis of political reform movements, of those underlying conditions which cause municipal reforms to succeed or fail. We have passed beyond the stage where we might be satisfied with the explanation that such and such a movement could or could not secure enough votes to succeed, or that such and such a man led the movement in one case and did not in another. We are slowly coming to the conclusion that there are certain definite circumstances under which nearly every movement for change and improvement is bound to fail; that there are other conditions of an economic character which lead very rapidly to the formation of a distinct municipal patriotism. It is this side of municipal life which has perhaps been neglected hitherto and which, notwithstanding, offers the most fruitful field for investigation at the present time.

THE ORDER OF CIVIC DEVELOPMENT.

In order to avoid innocuous generalities, let us outline more particularly the relation between what have here been called the primary, fundamental conditions of urban life and the general progress of municipal government. To begin with, the central fact of urban life is the physical phenomenon of a dense population. Whether we call this propinquity or physical contiguity, or what not, we find that it is the starting point of all distinctively urban influences. It is caused by commerce and manufactures, as has been so admirably shown by Mr. A. F. Weber in his valuable book on the "Growth of Cities." From this density of population, from the frequent contact of man with man, there results first of all contagion—contagion of disease, contagion of thought. If we contrast the rural with the urban environment, it is seen that the rural is, by reason of the lack of frequent contact, perhaps more favorable to independent meditation, reflection or generation of thought, whereas the communication of thought is most easily executed in the urban environment. Again, the frequent contact with a dense population produces a quick, nervous temperament. Conditions are not only more favorable in a general way to the communication of thought, but even under similar conditions, thought is, by reason of our greater nervousness, more rapidly and habitually communicated in the city than in the country. There arises a new psychic type of human being, possessing a much greater susceptibility to influence from other human beings, nervous, impatient, irritable, at times almost ecstatic or hysterical, one who depends for stimulus habitually upon his social surroundings. The impatience, the nervousness, the irritability of the urbanite explain, at least in part, the violence, the intolerance, the periodicity, the temporary character of anti-vice crusades and reform movements generally. These facts also explain why that gigantic turning of the world upon its mental axis, which we call the social movement, has taken place primarily in the cities. If man is a social animal the urban man is a socialistic animal. To the destiny of population and the frequent contact of individuals we must also trace the rapid development of modern reform movements of all kinds and the growth of liberty in the fifteenth, sixteenth and seventeenth centuries as a preeminently commercial or city phenomenon, in which the cities bought and paid cash for their liberty, while the country districts were yet unacquainted with the word. In the face of this immense field for the investigation of the primary conditions of city life it seems almost like a travesty upon teaching to direct our attention exclusively to the mere mechanism of city government.

CONCLUSIONS REACHED.

Finally, the necessity of encouraging independent research in municipal questions by affording an opportunity for immediate publication to such writings as are meritorious in character is quite apparent. There should be a considerable fund devoted to the publication of valuable monographs in this field, and no organization is better adapted to the establishment of such a fund than the National Municipal League. Such a set of publications would probably be more widely read and more easily supported financially than any other printed matter now dealing with political or social science.

To sum up briefly the conclusions suggested by the valuable report of the committee on Instruction in Municipal Government, it should be said, first, respecting the substance of instruction, that more attention ought to be paid to (a) Causes of municipal growth; (b) Analysis of urban psychology; (c) Urban social conditions; (d) Urban economics.

Second, with respect to the method of instruction, it appears desirable, wherever possible, to recognize the great importance of municipal questions by establishing separate courses of instruction in the subject. To this end an organized effort should be made to—

(a) Endow separate chairs or lectureships in municipal or urban science: (b) Establish some general publication fund for the encouragement of a series of monographs upon special subjects dealing with urban conditions; (c) The National Municipal League should seek, through the activities of its various committees, to establish and maintain a standard of instruction throughout the country, and should encourage and guide the investigations of students into the most profitable fields of research.

MUNICIPAL TELEPHONES IN FOREIGN CITIES.

In English cities, as well as those of other foreign countries, the municipal telephone is the competitor of the private companies, while in the United States the independent telephone companies are the ones which furnish competition. A great reduction in the price charged for telephone service has been the result in each instance, and the reduction is likely to be still greater within the next decade. The use of the telephone in both foreign and American cities has grown to enormous proportions.

Recent returns show that Norway has one telephone to each 144 of population; Sweden, 147; Luxembourg, 160; Switzerland, 172; Denmark, 211; Finland, 328, and the United Kingdom, 636. Among the cities of Europe, Stockholm probably marks the highest development of telephony yet seen. One person in every fourteen has a telephone there, there being more than 20,000 telephones in use in a population of 271,000.

London has more than 5,500,000 people and only some 10,000 telephones. The charges in London range up to $100 per year, while the State department asks only $14 per year for the same class of service in Stockholm. With the unlimited right of call the total cost of the telephone in Sweden is only $22; in Manchester, England, the charges run up to $50 per annum. In Sweden there are telephones for smaller users with limited right of calling, and the charges are proportionately lower. Every tobacconist's store in Stockholm, of which there are more than 700, is a public call office.

While the per capita number of telephones in use in Great Britain is less than in the other countries mentioned, the aggregate amount of business done is not so far behind. The telephone business of the United Kingdom is under the control of the National Telephone Company, with head offices in London. There are 988 exchanges throughout the country, which take care of 202,200 stations or subscribers, with the enormous number of 682,857,864 messages per year. The business of this company is steadily growing in spite of the opposition of the municipal telephones which are springing up all over the Kingdom. The National Telephone Company has added 29,221 sub-

scribers to its list during the past fiscal year, and the business, or number of messages, has increased 15.3 per cent., while the Post Office telegraphs, which are operated by the Government, transmitted only 90,000,000 telegrams, which shows an increase of only 2.88 per cent. over the business of the previous year. The friends of municipal ownership and those who favor governmental control and operation of such public utilities as the telegraph, telephone, express and similar lines of business, are expecting an enormous increase in the amount of business during the next five years and have no hesitation in predicting the downfall of the companies from lack of patronage.

In Glasgow the fight between the National Company and the Municipal telephone has been on for some months past. On January 1, 1900, the municipal telephone system had not gotten under way and had practically no subscribers, but at the present time it has about 6,000 patrons to 9,000 of the National Company. Half of the patrons of the former use both systems. The Municipal charge is $26 a year for an unlimited service, and the National charge is $50. The Municipal business is growing at a tremendous rate, and the authorities are now laying conduits which will accommodate 10,000 wires, and in some localities provision is being made for 16,000.

The following table will afford a means for comparing the amount of business, and the rates in various European cities:

City.	Subs.	Ratio.	Charges.
Amsterdam	1,925	1 in 260	$36
Berlin	28,785	1 in 80	36
Bergen	1,800	1 in 38	19
Berne	2,000	1 in 27	20
Cologne	3,784	1 in 85	36
Christiania	6,475	1 in 30	22
Frankfort	3,909	1 in 59	36
Florence	900	1 in 277	$30 to $40
Ghent	900	1 in 222	40
Hamburgh	12,064	1 in 56	36
Helsingfors	2,800	1 in 28	$16 to $28
Munich	1,864	1 in 230	36
Prague	2,200	1 in 146	21
Rome	2,162	1 in 238	33
Rotterdam	1,320	1 in 224	$27 to $37
Stuttgart	3,363	1 in 47	25
Stockholm	19,369	1 in 14	22
Trieste	1,003	1 in 165	21
Vienna	10,673	1 in 132	41
Zurich	4,400	1 in 35	$8 to $20

In Switzerland the telephone system is under State control, and in Zurich, with a population of 150,000, there is one subscriber to every thirty-five persons. The manner of making the charges for the telephone service in this city varies radically from the practice in other cities. For example, a subscriber is charged $20 for the first year's service; $14 for the second year, and $8 for the third and succeeding years, with a charge of one cent per conversation.

ACETYLENE FOR MUNICIPAL LIGHTING PLANTS.

BY AUGUSTINE DAVIS.*

THE municipal official who makes a thorough and unbiased investigation will learn that acetylene gas offers one of the best and cheapest means for town lighting. No one who has compared acetylene light with other illuminants will dispute its marked superiority.

That it is lower in cost in nearly every locality is readily demonstrated by making actual comparisons.

If it is true that acetylene lighting is better and cheaper than any other method of illumination, the sooner the advocate of municipal lighting satisfies himself of the fact, the more quickly he can benefit his constituency by his knowledge.

As to cost, calcium carbide can now be obtained by the ordinary user in a large portion of the United States for $3.75 for 100 pounds, or 3¾ cents per pound. For municipal use in large quantities it can, of course, be purchased for considerably less. One pound of good carbide will produce five feet of acetylene gas, which, in turn, will yield 240 candle power for one hour. Four pounds of carbide would then yield 960 candle power at a cost of 15 cents. Allowing for the reduction of cost in carbide when bought in quantities for municipal use, it would be perfectly safe to calculate the cost of 1,000 candle power, by use of acetylene, at 15 cents.

It requires five feet of ordinary gas to produce twenty candle power, or 250 feet for 1,000 candle power, which, at the low price of $1.00 per 1,000 feet—a rate made only by the largest cities—would cost 25 cents.

The ordinary charge for electricity is one cent per hour for 16 candle power incandescent lamp, and it requires more than sixty-two such lamps to produce 1,000 candle power, at a cost of over 62 cents.

If such a state of facts does exist, it will be asked why acetylene is not in more general use?

It is in use far more extensively than the ordinary citizen is aware, and its introduction on wrong principles has been so rapid that improper gas generation and the consequent unsatisfactory results are to-day the chief obstacles to its progress. Chemists, from its inception, have warned us that the proper generation of the gas can only be obtained by dropping carbide into water and not by dropping water on to carbide, yet, there is one manufacturer, who claims to have disposed of 20,000 generators, all of them of the objectionable type. Hundreds of other makers have been pushing the same kind of generators, almost invariably styling them as the "only perfect machine," until the clogging of pipes, smoking of burners, stench of over-heated residium, and the expense caused by the waste from after-generation, has created a smudge of discredit about acetylene lighting which requires a little persistent investigation to clear it of unjust criticism.

Something like seven years of general effort has greatly improved the quality of gas generation, as well as burners and other accessories, and acetylene lighting is now just as practicable and certain as is illumination by any of the longer established methods.

Rivals will tell you that it is "dangerous," "expensive" and a "failure," and will in many cases offer to prove it by citing instances where defective apparatus has been employed.

The insurance authorities have an established laboratory for the rigid examination of acetylene apparatus, and that it is safe, when passed at the laboratory, is backed by the cold-blooded commercial fact that no additional charge is made for insurance because of the installation of such plants.

Unfortunately, all the "safe" generators, from an insurance standpoint, are not by any means ideal from a gas producing view, and it will not do to accept insurance approval alone as a guide in purchasing.

A good town plant must be of the carbide-feed type; operate positively and infallibly, have a sufficient supply of water to absorb the heat of generation, contain all the gas of after-generation, and should be automatic in operation, not only as to feeding the carbide, but as to water supply and disposal of residium also.

A good aceylene plant, of, say, 2,000 light capacity can be purchased for approximately $2,000. Compare this with the cost of installing an electric plant of the same capacity. Any intelligent laborer can operate an acetylene plant, while it requires high-priced experts to run either an electric or water gas plant. The moment the power ceases in an electric plant that instant light fails, while with an acetylene plant the light is always "on tap." Acetylene gas having from twelve to fifteen times the illuminating power of water gas, can be conveyed through much smaller pipes and mains, and consequently the cost of piping is much less. It requires no skilled attendante and employs no heat or power. No town is too small to employ this method of lighting, while no city is beyond its capacity.

Its superiority as an illuminant is acknowledged. With cost of installation only a fraction of that for water gas or electricity, expense of operation merely nominal, and easily adaptable to the smallest or largest requirements, the persistent, unprejudiced investigator will find in acetylene the most promising factor in solving satisfactorily the problem of municipal illumination.

* Chicago, Ill.

GREAT IMPROVEMENT IN BRICK PAVEMENTS.

Much Learned by Recent Experience—Importance of Preserving Records—Water Tight Curb Stones—Remedy for Rumbling.

BY J. W. HOWARD, B. L., C. E.

EXPERIENCE with brick pavements has been so general in small cities and parts of large ones that they must be regarded as a class of pavement to be earnestly considered even by those who oppose them.

The opponents of brick pavements may be divided into two groups: First, persons financially interested in other kinds of pavements with which brick competes; Second, disinterested observers who have been impressed with failures of brick pavements coming under their observation.

The friends of brick pavements can also be placed in two groups: First, those who are financially interested in manufacturing or laying brick; Second, persons who have been favorably impressed with the successes of brick pavements.

Captain Eugene Griffin of the United States Army Engineering Corps, in one of his reports, makes the statement that, "The record of brick pavements is an irregular one." A statement which fortunately is true, because it is due to the irregular results, failures and successes of brick pavements that manufacturers of brick pavements for paving in their own interest have been compelled to improve their products. Cities and towns have been rendered cautious and have slowly corrected their specifications and enforced them, not only as to the quality of the brick, finished, but also the manner in which the pavements are now laid. In no class of pavement is it more necessary to use good materials and put them together in a proper way than for brick pavements.

CONSTANT TESTING NECESSARY.

Every precaution must be taken by the manufacturer who sells the bricks and by the contractor or city who purchases them to verify by close examination and periodic tests that the paving bricks used are equal to those called for in the specifications. The quality of paving bricks depends upon too many factors to be mentioned in this article. Their quality has improved steadily during the past twenty-seven years. When they began to be used in small American cities they then bore tests from 500 to 4,000 pounds per square inch, whereas now a brick which sustains less than 8,000 pounds per square inch would be rejected, and many will sustain more than 20,000 pounds. Specifications can safely call for a minimum of 10,000 pounds, and an average of 13,000. Crushing tests are not the most important; they nevertheless indicate the improvement in paving bricks which necessity and experience has accomplished. The other important tests are those of absorption of water, abrasion, transverse or breaking strength, homogeneous or uniform quality, density or specific gravity, to which must be added experience under traffic and other local conditions, which so affect street pavements. Files of the MUNICIPAL JOURNAL AND ENGINEER contain details of tests, etc., while future articles will give more valuable information.

PRESERVE AND CONSULT RECORDS.

Many cities have records of the tests to which they regularly have subjected the paving bricks offered for use in their cities, copies of which can generally be had for the asking. It must be remembered that because a certain make of brick has been successful it does not necessarily follow that the quality remains the same; therefore the necessity of constant inspection and trials of the bricks during the construction of all work in progress.

PREPARATION OF SUBSOIL.

Many brick pavements become uneven because the subsoil under the concrete or other equivalent foundations was not properly prepared, consolidated and sometimes drained by porous pipes below. Care should be taken that the soil after proper grading should be consolidated by a steam roller if possible, otherwise by a horse-roller or even rammers.

FOUNDATIONS.

The concrete foundations should be at least five inches thick. The cement, sand or crushed stone, or the cement and gravel that are used in some cities in America, and many in Europe for foundations of all kinds of pavements of asphalt, brick, granite, wood, etc., should be of good quality and thoroughly mixed in proper proportions with a suitable amount of water under the supervision of experienced men and rammed in place until a thin film of moisture appears on the concrete.

If the foundation is of crushed stone without cement it must be thoroughly consolidated with a steam roller and finished with a finer stone, mixed if possible with a little sand and cement, rolled on top of the crushed stone. This foundation of crushed stone is only suitable for dry localities and light traffic. The concrete foundation first mentioned is always the cheapest in the end.

WATER-TIGHT CURB STONES.

The curb or border stones must be firmly set, better than is usually done in most cities. The joints between them should be cemented to be waterproof, because water penetrating pavements and their foundations is one of their worst enemies at all seasons of the year.

Next spread a layer of moist sand or for very durable work a moistened mixture of one part of cement and from five to seven parts of sand, according to the quality of the cement. The depth of the layer should vary from one to two inches, sufficient to enable the paving bricks to be evenly set and at no point touch the concrete below.

Details as to placing the bricks in position at right angles with the line of travel, rolling them if possible with a steam roller, filling the joints with Portland cement grouting or asphalt filler, are details which must receive careful attention.

PREVENTION OF RUMBLING.

The hollow rumbling sound which so often occurs when brick pavements are laid upon concrete foundations can be avoided by putting temporary thin strips of wood between curb stones and the bricks, then removing the wood and filling the narrow spaces with an asphalt cement, or other reliable bituminous substance. It is wise, unless a bituminous grout is used for the whole pavement, to fill single continuous joints crosswise the streets at intervals of about twenty feet with hot asphalt cement or equivalent bitumen, using one which is not soluble in water. Avoid impure coal-tar and its products which deteriorate in hot and cold weather. These provisions permit expansion and contraction and prevent rumbling; also other injury to the brick pavement by great and sudden changes of temperature.

CONNECTIONS WITH OTHER PAVEMENTS.

Connections of brick pavements with other pavements must be carefully made. This is generally best done by imbedding long, narrow, carefully cut granite or equivalent stone strips at least fifteen inches in depth, on edge flushed with the surfaces of the pavements.

REPAIRS.

Repairs of brick pavements should be promptly made and defective bricks replaced, especially during the first two years of use, to insure uniform wear.

No one kind of pavement of asphalt, granite, brick or other material is suited to all streets of all cities. The problem is to select the right material for the right place and lay it properly without regard to the selfish interest of commercial agents, contractors or even city officials, who sometimes subordinate the true interests of residents and citizens to their own.

PROGRESS.

Experience and useless expense is overcoming the selfish and political defects, as well as the physical defects of street pavements of brick, asphalt and other materials.

The streets of our cities are no longer a disgrace, but are steadily improving. Many single streets are models even for European cities. We have had expensive experience with brick pavements, but with some results in less than a generation better than a century in Europe where brick pavements are little used.

THE USE OF ASPHALT PAVEMENTS IN GERMAN CITIES.

Popularity of Natural Rock Asphalt—Extensive Failures Led to Use of Wood—Subsequent Successs of Asphalt—Policy of Municipality—Terms of Contract—Mode of Construction.

BY E. KUICHLING, C. E.

THE publication of Genzmer's valuable new treatise on "Municipal Pavements" and a recent article on the same subject by Pinkenburg in *Deutsche Bauzeitung* have led the writer to believe that a brief account of the asphalt pavements laid in the principal German cities might be of interest to the readers of the MUNICIPAL JOURNAL AND ENGINEER.

These pavements are almost invariably made of natural rock asphalt spread upon a concrete base or foundation. The latter is from six to eight inches thick, while the thickness of the asphalt, after vigorous ramming and rolling, is about two inches. They were first introduced in Berlin in 1876, when only about 3,050 square yards were laid; but they quickly became very popular and were rapidly extended, as will be seen from the following statistics relating to that city: Extent in 1880, 127,000 square yards; in 1885, 385,000 square yards; in 1890, 784,000 square yards; in 1895, 1,425,000 square yards; and on April 1, 1899, 1,854,000 square yards, while the extent of wooden block pavement on the same date was only 89,200 square yards.

ASPHALT IN PARIS.

It may also be mentioned that rock asphalt for street paving purposes was first introduced in Paris in 1854, and that its advantages were promptly recognized by Baron Hausmann, Napoleon III.'s famous Minister of Public Works. Not only did it afford the means of securing a handsome, sanitary and comparatively noiseless pavement, but its continuity and difficulty of removal made it of little use for the formation of barricades by the turbulent element of the population, and thus contributed greatly to the preservation of law and order by the municipal authorities. Its use in most of the principal streets and avenues soon followed, but with the increased demand came competition and numerous attempts to reduce the cost by the substitution of inferior materials and methods, until finally the quality became so poor as to lead to early disintegration. This result became generally noticeable in Paris about 1880, and in consequence of the inability of the contractors to make proper repairs, asphalt pavements fell into serious disrepute.

CAUSE OF UNPOPULARITY.

In relation thereto, M. Leon Malo, the well known French paving expert, and director of the rock asphalt mines of Seyssel, which are controlled by the General Asphalt Company of France, states that up to 1878, all of the asphalt pavements of Paris were built and maintained by said company under contract, and gave entire satisfaction. In that year, however, the contracts expired, and the municipal authorities yielded to the pressure brought by rival paving corporations to open the work of construction and maintenance to general competition, and award the contracts to the lowest bidder. The consequence was that the work was taken at low prices by inexperienced firms, and performed improperly as mentioned above. In the course of five years over 240,000 square yards of the inferior asphalt pavements crumbled and the contractors went into bankruptcy, leaving repairs of enormous extent undone and creating widespread prejudice against this kind of pavement. The authorities then realized that such work could not be done in a hap-hazard manner, and thereafter gave contracts only to the most experienced and responsible firms, under strict inspection and limiting the source of the bituminous rock to a few quarries of established reputation.

This extensive failure of the asphalt pavements led to the introduction and development of wooden block pavements in Paris. The latter soon became very popular and replaced much of the defective asphalt, so that in spite of the persistent efforts of the best asphalt companies to restore the former prestige of their pavement, wood is still the favorite paving material in the French capital, as shown by the fact that at the present time the area of wooden pavement therein is over 1,434,000 square yards, while that of asphalt is only about 480,000 square yards.

INTRODUCTION IN GERMAN CITIES.

The disturbed political relations of the German States during the decade from 1860 to 1870 prevented extensive municipal development, and hence asphalt pavements did not find their way into German cities until after the success of the original Parisian pavements had been fully demonstrated by over twenty years' experience. The remarkable growth of these cities soon after the close of the Franco-Prussian War then led to a thorough investigation of the paving question by German municipal engineers, with the result that asphalt was selected in 1876 for Berlin and several other large towns. Except in the capital city, however, asphalt paving made comparatively little progress in Germany, owing to the rivalry with wood, and when the aforesaid failure of the Parisian pavements became generally known, it was regarded with suspicion, and in some cases with positive disfavor. In general the municipal authorities were inclined to watch the results found in Berlin with asphalt and in Paris with wood, and it was not until after 1880 that definite decisions were reached.

Thus in Munich and Konigsberg the preference was given to wood, while in Breslau and Dresden asphalt was the favorite; but curiously enough a revulsion of sentiment occurred in nearly all these cities, Munich now favoring asphalt, while in Breslau and Dresden wood appears to be preferred. The choice in favor of wood may perhaps be due, in some degree at least, to the patriotic desire to make use of home products, as the bituminous rock found in Germany does not appear to be as well adapted to paving purposes as that which is found in foreign countries. To indicate the extent of such pavements in the cities mentioned, it may be remarked that at the present time Munich has about 44,300 square yards of wooden block pavement, while Breslau has 75,300 square yards of asphalt.

REASONS FOR REJECTION.

In most cases where asphalt was condemned, the ostensible reason was that the climate of the city was unfavorable, being either too warm or too cold, too moist or too dry; but the opinion of the best recent writers on the subject appears to be that climatic reasons are entirely unfounded. The cities named above are not so greatly different in climate as to afford reasonable ground for such condemnation. In Berlin the winters are longer and more severe than in Paris; hence, if this circumstance really affected the use of pavements, it might be anticipated that asphalt would be less successful in the former than in the latter city; and similarly in more extreme cases of range of temperature, such as Paris and St. Petersburg. Greater steepness of grade is also sometimes assigned as a cause for rejection, but this cannot be true in the cases mentioned, as the topography is very similar; and, in fact, in most large cities, the principal streets have grades which are well adapted to asphalt. The real reason must therefore be sought in the direction of durability and maintenance, and here the policy pursued by the municipal authorities becomes of the utmost importance.

POLICY OF MUNICIPALITY.

If this policy is to award the construction of asphalt pavements to the lowest bidder with a maintenance guarantee of only a few years, it may safely be assumed that this kind of pavement will soon become unpopular. The peculiarity of the asphalt appears to be lack of perfect homogeneity, despite the utmost care in its preparation; consequently defective spots often develop, which increase

in size with extraordinary rapidity in comparison with similar defects in stone, brick or wood pavements. To keep up the good appearance of the asphalt all incipient defects must be promptly repaired, and the pavements must therefore be closely inspected at frequent intervals. Furthermore, while the repairs are made in a relatively simple manner, they involve the necessity of an extensive plant and the permanent employment of skilled workmen. The proper maintenance of such pavements accordingly requires a large capital and a commensurate amount of business in order to keep the repair account within reasonable limits, even when the best materials and methods of construction are used in the outset; and, if poor materials are provided, it is not surprising to find that the maintenance will be very costly, thus leading to the early bankruptcy of the contractors when the municipal authorities enforce the guarantee. By such failure the expense of soon repairing cheaply made pavements is thrown upon the community or abutting land-owners, and asphalt as a paving material becomes discredited.

On the other hand, in cities where the policy of allowing only experienced and responsible contractors to bid for asphalt paving work is pursued, and the material used is restricted to the output of well-known mines, this class of pavement will usually retain its popularity if the contractors are contented with a reasonable profit. In these cases a certain degree of competition is encouraged, although work enough is provided to keep the best plants properly employed. As a consequence the various contractors or companies are constantly striving to improve their work by the closest attention to details of construction and repair, hoping thereby to win the confidence of neighboring smaller communities and thus extend their sphere of activity. Such is the case in Berlin, where seven different asphalt paving companies are now doing buisness, most of them having branches in other European cities.

USUAL TERMS OF CONTRACT.

The contracts in German cities usually require a new asphalt pavement to be kept in perfect repair for a period of nineteen years, beginning on April 1 of the year following the completion of the work. During the first four years the contractor receives no compensation whatever for necessary repairs, but for the remaining term of fifteen years he is paid at the rate of ten cents per square yard per year for the entire area under contract. The usual price paid for a new pavement having an eight-inch concrete foundation and a two-inch rock asphalt wearing surface is about $2.81 per square yard; to this must be added the price of maintenance, as aforesaid, thus making the total sum paid to the contractor in the course of nineteen years $4.31 per square yard. Prior to 1896 the price for new pavements of this class was $3.31 per square yard, but by competition, improvement and increase of work it was reduced to the price mentioned above, the charge for maintenance remaining the same.

COMPOSITION OF ASPHALT.

As already stated the asphalt street pavements of German cities are almost exclusively made of pulverized bituminous rock compressed by ramming and rolling. The source of supply and approximate composition of the raw material used by the seven companies operating in Berlin and other European cities is shown in the following table:

Source.	Bitumen.	Carbonate of Lime.	Carbonate of Magnesia.	Other Substances.
Val de Travers, Switzerland..	8%	91%	....	1%
San Valentino, Italy.....	10.4	60.5	27.1	2.
Rocco Morice, Italy..... ..	12 5	77.5	4.7	5.3
Ragusa, Sicily.....	9.	89.	....	2.
Limmer, Hanover.....	14.3	67.0	*	18.7
Vorwohle, Brunswick.....	8.5	80.0	0.6	10.9
Seyssel, France.....	13.6	85.0	....	1.4

* Denotes that percentage is not given separately.

With reference to their composition, preference seems to be given for street pavements to the bituminous rocks which contain only a small percentage of magnesia and clay, and the owners of mines or quarries whose product contains comparatively much of these substances endeavor to make a durable pavement material by judiciously blending their output with bituminous limestones from other workings. In general, these mixtures are still regarded with more or less suspicion, and their use is permitted only when the reputation and financial responsibility of the contractor is firmly established. The artificial asphaltic paving material in common use in our American cities does not seem to be satisfactory to the German municipal authorities, and it is mainly employed for making temporary repairs to the rock asphalt pavements in wet or unfavorable seasons. When thus used, it is required to be cut out as soon as practicable afterward, and the permanent repair made with the standard rock material.

MODE OF CONSTRUCTION.

In the construction of new pavements, great stress is laid upon having the concrete foundation perfectly dry before applying the hot pulverized asphalt, the opinion being that when the concrete contains appreciable moisture steam is generated at its surface, whereby a close contact of the asphalt and concrete is prevented. Subsequent cracks then allow water to penetrate to the surface of the concrete, either from above or below, and be absorbed in the more or less porous lower portion of the asphalt layer, thereby preventing its ultimate compression under traffic. To facilitate the work of construction in damp weather, or after a rain, it is a common practice to first cover the concrete foundation with a layer of the hot powdered rock to cause it to become thoroughly dry, and then to sweep it aside and apply a fresh lot of hot material to make the wearing surface of the pavement. After the covering material has become sufficiently cool, it is removed and reheated. It is also considered very desirable to make the concreting operations continuous, as a good union cannot be made between concrete which has become hard and that which is fresh.

Where street railway tracks occur, it was formerly deemed necessary to place stone paving blocks of considerable thickness alongside of the rails, but latterly this practice is being abandoned and the asphalt is brought up directly against the rails. The latter are usually bedded in concrete, and when any space is left at the sides of the web between the head of the rail and the surface of the concrete, the same is carefully filled with mastic so as to provide an even abutting surface for the rock asphalt. In spite of all precautions, however, such tracks cause much trouble and expense for repairs to the pavement, and a satisfactory solution of the problem has yet to be devised.

To the foregoing brief outline of the recent asphalt paving practice in Germany much more might be added, but it is believed that enough has been given to show in what respects it differs from the plans followed in our American cities. Aside from the difference in material, the principal feature is the long term guarantee of maintenance, and it will be interesting to compare the average cost of repairs to our pavements for a period of nineteen years with the aforesaid contract cost of maintaining the pavements in the large German cities.

FIRE-PROOFING METHODS FOR BUILDINGS.

Great Fire Loss on Account of Poor Construction—Better Record in European Cities—Need of Reform in Municipal Building Laws in America.

BY J. W. HOWARD, B. L., C. E.

FIRE in its place is a blessing; out of place, a curse. Its extinction is important; its prevention more so. Our property and our lives are involved. A few examples indicate what may recur and show that it would be cheaper to make our constructions more fireproof than to suffer such losses. Moreover thousands of lives are each year uselessly lost and thousands of people hopelessly discouraged. Collectively we realize this, individually we do not; therefore it is the duty of the collective bodies of our nation, state and cities to provide and execute better fire-prevention building laws.

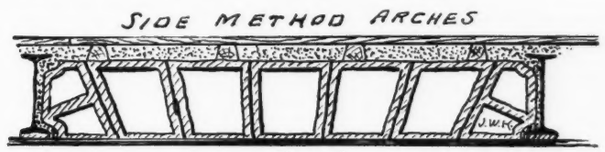


FIG. 1

The annual losses in civilized Europe, the United States and Canada are about $800,000,000, of which only $200,000,000 are insured. The cost of insurance upon billions of dollars of property is a heavy financial load. With more fireproof buildings the insurance would be less and the loss less. The losses of the past would make every civilized city fireproof.

IMMENSE FIRE LOSS.

Examples of loss by fire, from a few of many cities, are as follows:

Albany, N. Y.—Great fires, $3,000,000; usual fires, $10,000,000. Total in nineteenth century, $13,000,000.

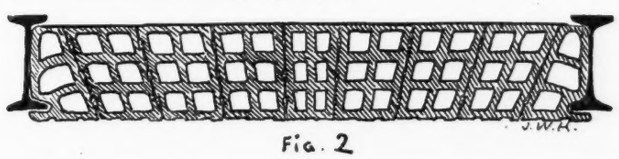


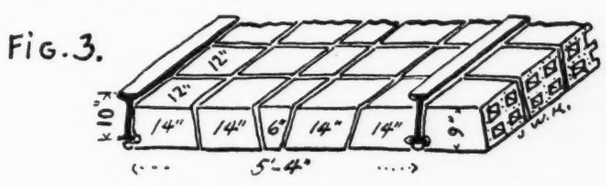
FIG. 2

Boston, Mass. (including fire of 1872 of 776 buildings).—Great fires, $88,000,000; usual fires, $20,000,000. Total losses, $108,000,000.

Chicago Ill. (including fire of 1871 of 17,430 buildings).—Four great fires, $202,000,000; usual fires, $92,000,000. Total losses, $294,000,000.

Charleston, S. C.—Total losses, $24,500,000.

New York, N. Y.—1835, 530 buildings, 52 acres, $15,000,000; 1845. 300 buildings, $8,000,000; great fires, $23,000,000; usual fires, $120,000,000. Total losses, $143,000,000.



Pittsburg, Pa.—Total losses, $42,000,000.

Portland, Me.—Great fires, $12,000,000; usual, $14,000,000. Total losses, $26,000,000.

San Francisco, Cal.—Great fires, $15,000,000; usual, $52,000,000. Total losses, $67,000,000.

Savannah, Ga.—Total losses, $16,000,000.

Quebec, Can.—Total losses, $32,000,000.

Montreal, Can.—Total losses, $23,000,000.

London, England, in 798 was wholly destroyed; 982, more than half; 1086, one-third; 1212, one-half; 1666, four days' fire, 13,200 houses, churches, libraries—value in money, $255,000,000; 1794, 630 modern houses, $8,000,000; 1794, 1834, 1861, 1893, great fires, but less and less large because of stone, brick, concrete and fireproofing being extended. Total losses in nineteenth century, $205,000,000.

Paris, France, except for the Commune and incendiaries in 1871, when they burned property worth $160,000,000, has lost in the nineteenth century by fire only about $43,000,000. The buildings, large and small, even the workingmen's houses, have walls, partitions and floors filled with concrete or its equivalent. This applies even to the smallest towns of France. Many French and other European cities have expended less—and made their buildings fireproof—than an equivalent number of United States cities of same population, and in the same time have paid for expensive fire department, high insurance and loss by conflagrations.

MORE STRINGENT REGULATIONS NEEDED.

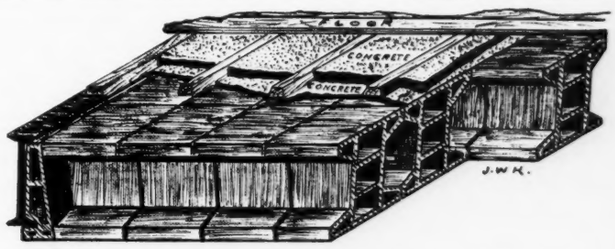
Several of our cities have made excellent beginnings and a few great progress in the past twenty-three years. General mandatory national and state laws are needed; also local city and town building regulations, specific, but not too much so, because the conditions of construction are so varied that the good judgment of the official or committee in charge of building permits and inspection of erection is needed to accept proper plans and new and

FIG. 4

Side method skewbacks & centre — and end method between. Combination System.

safe fireproof methods when presented. There is a new field opening in our cities, even the smallest. It is that of a fireproofing engineer. Efficient and honest services are more and more sought for. Mere politicians are passing from direct charge of our building departments as well as from those of health, water supply and other vital details of city life.

The fireproof building limits of a city should be rapidly extended to cover the entire city; in one zone only fireproof construction allowed; in the next slow burning; in the outer zone only the most modern safeguards used in buildings of wood. In



Excelsior" End Construction

FIG. 5. Flat Arch

time the first zone should be the whole city, with every building fireproof, as in many European cities. By buildings, I mean structures of every kind, whether for public or private use. A fire extinguishing department and apparatus will always be needed because goods and chattels burn even in a fireproof building, sometimes with little or no damage to the building.

Our very expensive fire departments, from being one of the greatest burdens, can become gradually one of the least expensive in the annual budget of a city.

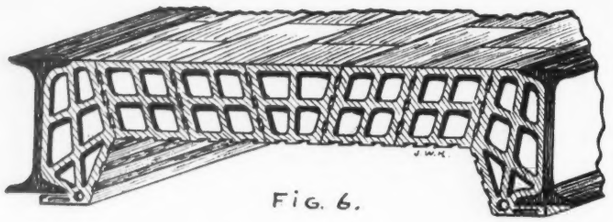


Fig. 6.

Hollow Brick for Flat Arches
Supported on Raised "Skew backs"

BUREAU OF RECORDS AND STATISTICS WANTED.

If we had a Bureau of Official Statistics in each city, large and small, we would soon learn how to improve many departments and how to save money by making buildings less likely to burn. Cities could compare results with great detriment or benefit to each succeeding administration in a city and with other cities to the benefit of all.

Buildings can be classed by materials into four general groups:

First—Temporary sheds and coverings. These should be so placed, used and removed as to be as little menace as possible to themselves or their neighbors.

Second—Wooden buildings, so largely used in America, can be rendered much safer than at present by inspection of old ones and supervision of new ones. The initiative must be taken by the

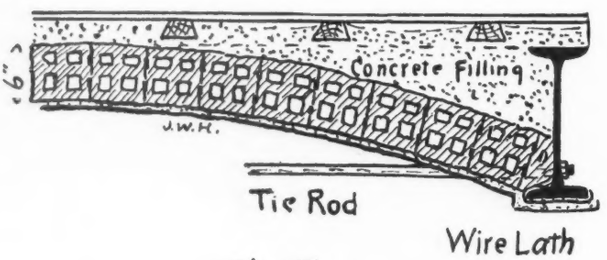


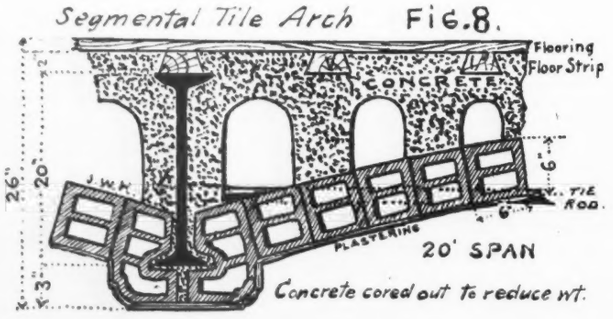
Fig. 7.
Segmental Tile Arch

building superintendent or department in each city. Do not wait for the architect or builder to propose improved safeguards against fire.

Third—Buildings of combined brick or stone, masonry and wood floors, partitions, roof beams, etc. These can be made very safe, or at least slow burning, as is done a little here and all over Europe by having the walls, partitions and floors filled with light bricks, light concrete or equivalent, the use of slate, tiles or other non-combustibles instead of shingles on roofs; also a proper arrangement of heating and other conveniences of modern buildings.

Fourth—Buildings of masonry, concrete and iron of old and modern types. The older types are the public and other buildings in European capitals, and in Washington and a few cities in America. They, while solid and safe, are, however, being built less each year. The modern type with steel frames are appearing

Segmental Tile Arch Fig. 8.



everywhere not only for high but also for small buildings. Even private residences can be now made of light steel frames and fireproof at little expense.

FIREPROOFING METHODS.

It is not the purpose of these articles to treat of the details of buildings, but to simply indicate the methods of fire-proofing modern buildings. Nor is it possible to give more than a few general types. Assuming that a building is complete, ready for the fireproofing, we find the foundation and superstructure in place. The walls are steel columns and frames filled and faced with brick, stone or other suitable outside material, or of masonry without steel columns, etc. The floor and roof systems of steel, etc., are in place. Pipes and other requirements are arranged.

Fawcett Ventilated Fireproof Floor

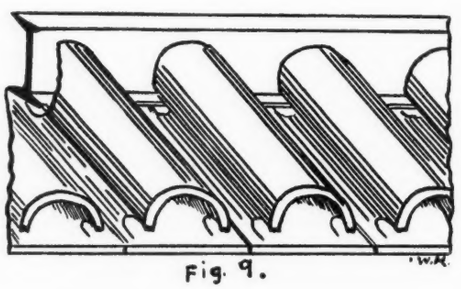


Fig. 9.

The fire-proofing will be described under the following captions:

1, Floors and ceilings; 2, Columns and girders; 3, Partitions; 4, Roofs and ceilings below; 5, Walls and furring (lining); 6, Fireproof wood finishing, etc.; 7, Tests of fire-proofing by special methods and actual fires.

1. *Fireproofing Floors and Ceilings.* There are now in use three general systems of floor fire-proofing. One is of flat or almost flat arches of specially shaped hollow blocks of burned clay or other materials. The second of concrete arches combined with some supporting device. The third is where solid pieces of terra cotta, fire clay or other materials are laid in single lengths between the beams and covered with concrete or other filling.

Tile arches are of two classes, dense and porous hollow blocks. When porous blocks are used in ceilings or walls, nails can be driv-

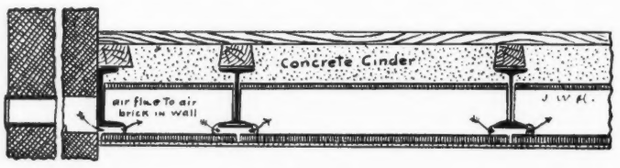


Fig. 10.

en into them. They are strong and lighter than when solid clay is used to make the hollow blocks. There are two methods of constructing flat arches between the beams. One is the side construction with holes in the blocks parallel to the beams, as shown in Fig. 1, which is for concrete on top, or Fig. 2 not requiring a filling.

The other or end construction is shown in Fig. 3.

The two combined, so as to get a flat bearing at the skew-backs and the strength of end construction, which is greater than side construction, is shown in Fig. 4.

Another end construction is shown in Fig. 5.

The strips of wood on which to nail the floor are shown; also the concrete filling. The tile blocks extend under the iron beams to protect them from heat in case of fire and to facilitate plastering the ceiling. This arch can be used up to ten feet, but usually only from four to nine feet with corresponding depth of blocks from eight to twelve inches and weight of porous blocks from twenty-seven to thirty-eight pounds per square foot of surface.

The hollow clay (not porous) bricks in Fig. 6 are suitable for some floors and roofs. The grooves in these, as other blocks, are to hold a little mortar between them and the plaster on the ceiling below.

The curved or segmental floor arch is shown in Fig. 7. It is of hollow or other light bricks. Where it is not necessary to have a flat ceiling this is an excellent and very strong arch. The tie rod is not necessary except for spans greater than eight feet. With tie rods the span can be made twenty feet. This construction saves steel or iron as less beams are needed.

The weight of this curved arch is almost ten pounds per square foot for four inches thick, and eight feet or less span, or forty-one pounds for eight-inch thick blocks and twenty-foot span. The weight of concrete and floor above and plaster below must be added.

Another type of curved arch is shown in Fig. 8. The concrete is hollowed out to avoid weight. The metal is protected from fire from below as is necessary because iron beams begin to bend easily at 1200° F.

The Fawcett system is a type of several where solid pieces are laid between the beams or joists. Its end view is shown in Fig. 9 and side view in Fig. 10.

The pieces are round and hollow above and flat for the ceiling below. They are of fire or pot clay. They rest on the flanges of the beams, while a part goes under the flange. Air is admitted to this floor from special open-air bricks in the walls. In case of fire, the hot air in passing up and away keeps the floor cool and prevents destruction. This floor is light, thin, strong and easy to erect because no supports or centres are needed. A concrete filling goes on top.

The Guastavino arch is a very flat dome made from small tiles, six by eight by three-quarters inch thick, very carefully cemented together in three or more layers. It is useful over a space up to about twenty by forty feet, especially where solid masonry walls are on all sides. It is very strong when properly constructed. It is of special and general application.

(To be continued.)

THE PRIVATE AND MUNICIPAL GAS SUPPLY OF BERLIN.

BY WALTER S. ALLEN.

THE history of the gas supply of the city of Berlin presents many points of interest, as the introduction of gas was by a private company, which continues to do a large and profitable business, although the city has since built works and has confined the company to the streets which it occupied at the time when the city went into the business.

In 1825 the city made a contract with the Imperial Continental Gas Association of London, giving this company an exclusive right for twenty-one years to lay mains in the streets and to supply gas, and this contract provided further, that if, at the expiration of the time, it was not renewed, the company should be allowed to retain its mains in all the streets which it had already occupied and might continue to supply all those who desire to buy gas from it.

MUNICIPAL PLANT STARTED.

In 1844 the city notified the company of its desire to terminate the contract, and on January 1, 1847, the city began the supply of gas from its own works. To make up for the loss of business in the city, the company extended its field of supply outside of then existing municipal limits of Berlin, and succeeded in making exclusive contracts with several neighboring towns for terms of fifty years. Some of these towns have since been incorporated into the city, but the contracts remain in force, and the curious spectacle is presented of a municipality prohibited from supplying gas from its own works, even to itself, in a large district within its own boundaries.

REDUCES PRICE TO CONSUMERS.

As soon as the city began to supply gas there were reductions in the price and some competition, but an agreement was soon reached by which the price was fixed the same by both parties, the company, however, being allowed to give a discount of 5 per cent., and this agreement remained in force for nearly fifty years, being changed only on April 1, of the present year. During this long series of years all changes in price have been made by both parties at the same time.

For the last few years the price of gas for lighting has been fixed at $1.13, and for cooking, heating and mechanical purposes at 71 cents per thousand cubic feet.

PRIVATE COMPANY PAYS LARGE BONUS.

On April 1, 1901, a new agreement was made with the Imperial Continental Gas Association and a new schedule of prices went into effect. The new contract runs for ten years and contains the following provisions: The company will continue to pay to the city the same sum of money as heretofore, about $125,000 per year; the price of gas supplied by both parties is fixed at 92 cents per thousand cubic feet, for all purposes, less 5 per cent., the former differential rate allowed the company being abolished; the supply of gas in Schoneberg, one of the towns now incorporated in the city and in which the company had an exclusive right until 1904, remains the exclusive right of the company during the life of the new contract, but the street lighting within this district, which was formerly paid for by the city, is now to be furnished free, and both parties agree that gas supplied through penny-in-the-slot meters shall be charged for at the rate of $1.06 per thousand cubic feet.

IMMENSE OUTPUT OF CITY PLANT.

The last annual report of the city works, covering the year ending April 1, 1900, gives the following information as to the work of the department. The total amount of gas supplied by the city was 4,710,314,500 cubic feet; distributed as follows: for lighting, 2,991,032,100 cubic feet; for heating, cooking and mechanical purposes, 1,320,515,700 cubic feet; for street lighting, 373,909,700 cubic feet, and for other purposes, 24,857,000 cubic feet.

The length of mains in use is about 612 miles and there are 145,299 meters in use. Of these meters 99,270 are for lighting gas, 44,795 for cooking and heating gas, and 1,234 for gas engines. There has also been installed, as an experiment, 151 penny-in-the-slot meters.

NEARLY $2,000,000 PROFIT A YEAR.

The financial statement shows the following figures: The total income was $4,455,260 and the total expenses were $2,122,860, leaving a profit of $2,332,400. From this gross profit there was deducted for amortization of the debt $251,050; for depreciation, $441,100, and there was paid for interest $218,555, leaving an actual net profit of $1,422,705, which should be increased by the cost of the street lighting, furnished free, amounting to $386,055 so that the net gain to the city was $1,808,760.

The total amount spent on the works since the beginning has been $19,599,916, from which there has been charged off for depreciation $5,159,913, leaving the book value of the works at $14,440,003. Against this valuation there are outstanding bonds and debts amounting to $6,554,024, so that the net value of the gas works as an asset of the city is $7,885,979.

No recent figures concerning the operations of the English company are available, but the output of the works has been in the past about three-fifths that of the city works.

UNIFORM PRICE NOT SATISFACTORY.

The feature of the new schedule which has provoked the most discussion is that establishing a uniform price of gas for all purposes, inasmuch as it raises the price of gas used for other purposes than light by 16.4 cents per thousand cubic feet while reducing the price of lighting gas by 25.6 cents. Considerable discussion of this point took place in the City Council at the time of the ratification of the contract and attention was called to the fact that the principal increase in the output during the last few years had been for these other uses of gas. It was, however, shown that since more than twice as much gas was used for lighting as for all the other uses that the people would benefit by this change to a uniform rate for all gas, and the contract was accepted with only fifteen votes in the City Council in opposition.

THE NEXT MEETING OF THE LEAGUE AT JAMESTOWN.

The Reasons for Attending—Extensive Municipal Exhibits—Great Preparations for Entertainment—Tom L. Johnson to Speak on the Three-cent Fare.

J. EMIL JOHNSON,
Mayor of Jamestown, N. Y.

THERE is no more important municipal organization than the League of American Municipalities. It will hold its fifth annual convention at Jamestown, N. Y., August 21, 22, 23 and 24, 1901. The convention is open to all cities that wish to send representatives and, therefore, the League gives the most cordial invitation to all cities, towns and villages. At the last annual gathering at Charleston, S. C., last December, there were cities ranging in population from 3,000 to 3,500,000 represented.

REASON FOR ATTENDANCE.

The reasons which the League gives, why every municipality should become a member of the organization, are sufficient to induce cities of all grades to be represented at the next meeting at Jamestown. The reasons for membership are as follows:

"1. The League represents the first and only united effort on the part of city officials in all departments to study the various and complex questions involved in municipal administration with a view to giving their constituents the very best of public service by the most approved methods and at the lowest cost to the taxpayers.

"2. The League furnishes the organization necessary for the proper protection of municipalities against the encroachments of private contractors and corporations; through this organization fair dealing between municipal and private corporations may be secured, with proper protection to the interests and rights of both.

"3. The League provides for mayors and council members, most of whom have but a limited time to devote to their official work, a ready and convenient means for securing reliable information pertaining to questions upon which they must act for their municipalities.

"4. The League provides for the heads of all municipal departments an economical and prompt method for the interchange of their experiences and ideas. Methods of securing improved public service are communicated from the departments of one muncipality to the corresponding departments of others.

"5. The League is composed exclusively of city officials, who are in a position to study and discuss municipal problems from a practical standpoint. Real municipal reform must come through the efforts of men whose experience as city officials gives them a correct view of the conditions and obstacles that must be met, and enables them to formulate practical instead of theoretical plans.

"6. It is a fact that the best municipal reform so far realized in this country is the result of studious work accomplished by the officials themselves; therefore, any organization that has for its object the mutual study of municipal government by municipal officials promises good results and deserves encouragement.

"7. The League is not a social organization, nor does it exist for the selfish purpose of advancing the business or professional interests of individuals; its work is exclusively to advance public interests; to improve the conditions of urban life.

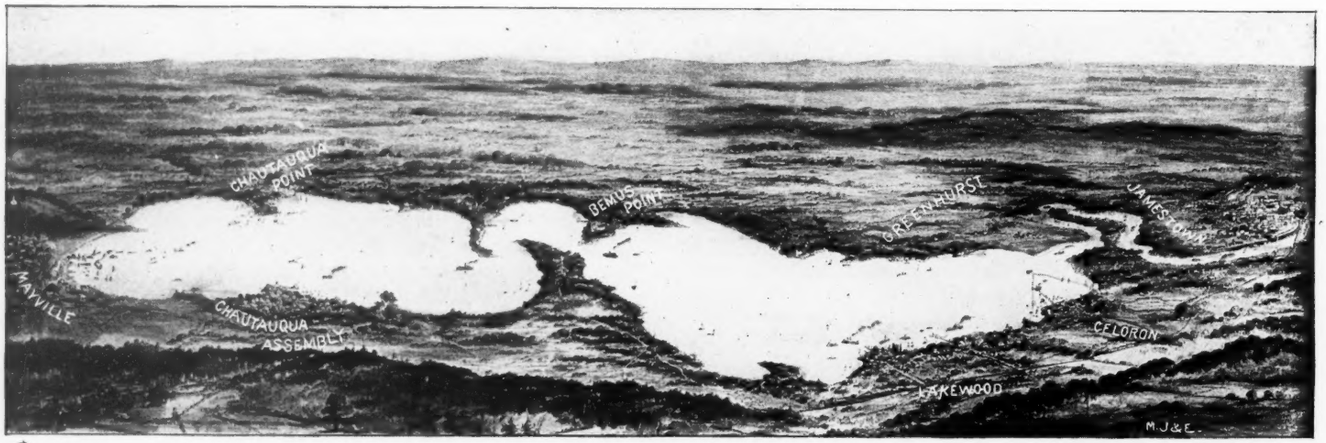
"8. Memberships are held in the name of the municipality, justly at the expense of the municipality, and in this way permanency of organization is assured. Every individual official of a membership city is entitled to the privileges of membership. The annual dues are exceedingly low, and the League gives to the officials of every membership city a service unquestionably worth many times the membership fee.

"The League works not only during the few days of its annual convention, but every day throughout the year. It maintains a permanent bureau of information, which is at the service of all members at all times. This bureau furnishes reliable replies to all inquiries on municipal subjects sent to it by the officials of membership cities.

"10. At the annual convention of the League carefully prepared papers on the most important municipal subjects are presented and discussed. The papers and discussions, which are afterwards printed in book form, bring out many original ideas and valuable suggestions for the general improvement of municipal service."

A RICH PROGRAM PROVIDED.

Secretary MacVicar, with the assistance of the program committee, has arranged a fine program, as follows:



BIRDSEYE VIEW OF CHAUTAUQUA LAKE—JAMESTOWN AT NORTHERN EXTREMITY.

Address of welcome, Hon. J. Emil Johnson, Mayor of Jamestown, N. Y.; response for the League, Hon. J. A. Johnson, president, Mayor of Fargo, N. D.

"Municipal Lodging Houses," by Hon. James K. McGuire, Mayor of Syracuse, N. Y.

"Special Assessments for City Work," by Hon. James L. Weeks, City Attorney of Jamestown, N. Y.

"The Contract System for City Work," by Hon. S. F. Crabbee, City Engineer of Fargo, N. D.

"The Value of Municipal Leagues," by Mr. William S. Crandall, editor of the MUNICIPAL JOURNAL AND ENGINEER, New York.

"Municipal Restrictions on Vice," by Norman Fox, D. D., Mayor of Morristown, N. J.

An address by Mayor Arbuthnot, Winnipeg, Can.

"The Cost and Durability of Brick Pavements in Ithaca," by Prof. C. L. Crandall, Cornell University, Ithaca, N. Y.

"The Development of Bituminous Pavements; Embracing the Use of Coal Tar and Asphalt in Street Work," by Mr. Fred J. Warren, Boston, Mass.

An address by Hon. A. A. Ames, Mayor of Minneapolis, Minn.

A paper by Major Richard Sylvester, president National Association of Chiefs of Police of the United States, Washington, D. C.

"Low Fares as the Best Method of Remunerating Cities for Franchise Rights," by Hon. Tom L. Johnson, Mayor of Cleveland, Ohio.

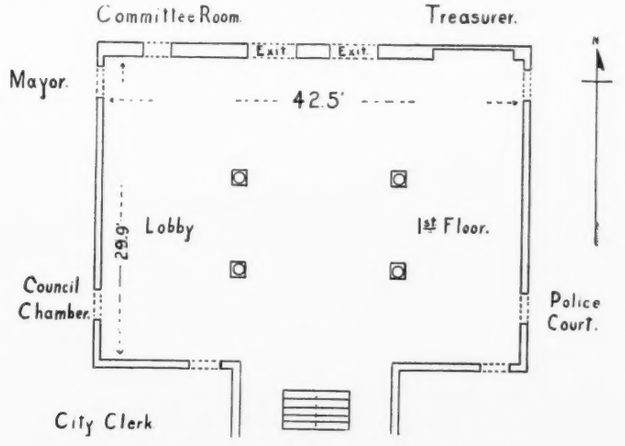
An address by Hon. Samuel M. Jones, Mayor of Toledo, Ohio.

"Taxation," by Hon. Lawson Purdy, secretary Tax Reform Association, New York.

"Practical Palliation of Uniform Accounting to City Comptrollers' Reports," by Mr. Harvey S. Chase, Boston, Mass.

"Public Ownership of Public Utilities," by Mr. Lee Meriwether, St. Louis, Mo.

"The Proposed Ohio Municipal Code," by Hon. Edward Kibler, Newark, Ohio.



PLACE FOR EXHIBITS—FIRST FLOOR, CITY HALL.

"Steel and Concrete in Municipal Construction," with stereopticon views, by Mr. Merrill Watson, New York.

MANUFACTURERS' EXHIBITS.

One of the most interesting features of the convention will be the exhibit of pavements, water and gas supplies, electrical apparatus, road rollers, road scrapers and all kinds of road making machinery, including an asphalt repair plant; garbage furnaces, street cleaning machinery, various kinds of construction material, including expanded metal, fire apparatus and everything else that is employed in the construction and maintenance of the modern city.

Ample room, both inside and outside of the City Hall, has been provided by the exhibits committee, which is named below. Manufacturers can learn full particulars by addressing the chairman of this committee and at the same time engage floor space without any charge.

CITY HALL, JAMESTOWN, N. Y.

GREAT PREPARATIONS.

The city of Jamestown has been planning for the entertainment of this convention for weeks past, and at the present writing the arrangements are well under way. It is hoped that many ladies will be in attendance at this convention, for special efforts will be made to see that the ladies have an interesting time. The committee on entertainment has already planned for a trip on the famous Chautauqua Lake, an evening at the theatre, and the like, which will furnish enjoyment for both ladies and gentlemen.

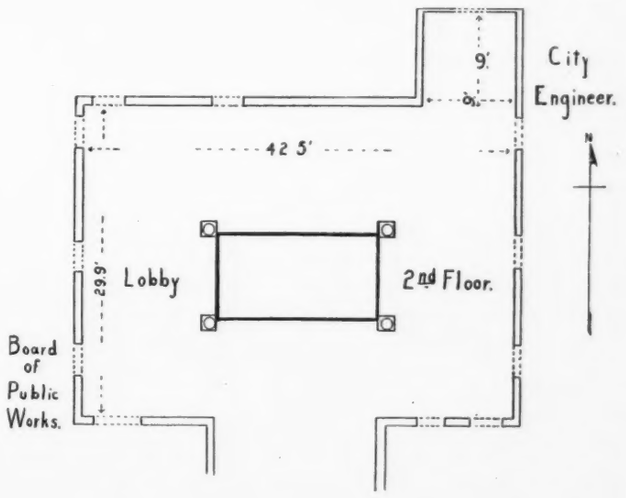
CHAIRMEN OF COMMITTEES.

Executive, Frederick A. Fuller, Jr.; finance, O. E. Jones; printing, F. P. Hall; exhibits John B. Collins; decorations, W. A. Bradshaw, Jr.; hotels, M. R. Stevenson; entertainment, L. C. Jagger; reception, Hon. J. B. Fisher.

ONLY AN HOUR'S RIDE TO BUFFALO.

If there is any special reason for attending this national gathering of city officials other than those already given, it may be found in the fact that this is Pan-American year. Buffalo is only an hour's ride from Jamestown and it will be an easy matter to extend the trip to the exposition. The managers of the Pan-American have selected August 26 for "Municipal Day," which is the first Monday following the adjournment of the League meeting at Jamestown. This gives another reason for the city official to plan beforehand so that nothing may interfere with his attendance at this convention.

Secretary MacVicar writes that practically all the railroads have assured him that a rate of a fare and a third will be granted to all those who wish to attend this convention. This, together with the low tourist rate which will be granted to all those who wish to attend the Pan-American Exposition, will make it possible for a large number to attend at a low rate for transportation.



PLACE FOR EXHIBITS—SECOND FLOOR, CITY HALL.

MEETING OF THE AMERICAN WATER WORKS ASSOCIATION.

Twenty-first Annual Gathering—Largest Attendance in Years—Splendid Entertainment—An Excellent Lot of Papers Presented—Water Meters Urgently Recommended—Chicago Next Meeting Place.

THE twenty-first annual gathering of the members of the American Water Works Association took place in New York City on June 17 to 21. The registered attendance was unusually large and the papers presented for discussion of more than usual interest and value. Several of them are given in this issue of the MUNICIPAL JOURNAL AND ENGINEER. If the warm expressions of approval of the delegates are to be fully credited the association has never had so pleasurable entertainment provided by any other city than that given at this convention. It included a trip to Glen Island, trolley rides and an excursion to and inspection of the Croton Dam, now nearing completion, with refreshments at every opportunity.

The following corps of officers were chosen to serve during the ensuing year: President, William R. Hill, Chief Engineer of the Croton Aqueduct Commission; first vice-president, C. H. Campbell, Superintendent of Water Works, Charlotte, N. C.; second vice-president, D. H. Maury, Chief Engineer and Superintendent of Water Works, Peoria, Ill.; third vice-president, Charles E. Rowe, Secretary Board of Water Works, Dayton, O.; fourth vice-president, Dow R. Gwynn, President Board of Water Works, Terre Haute, Ind.; fifth vice-president, George H. Felix, Water Commissioner, Reading, Pa.; secretary and treasurer, Peter Milne, C. E., New York City. Finance committee: William H. Laing, Manager Water Works, Racine, Wis.; J. H. McConnell, Supervisor Water Works, Minneapolis, Minn.; A. A. Tucker, Superintendent Water Works, Memphis, Tenn.

Chicago was selected as the next place of meeting.

RESULTS OBTAINED BY ALBANY FILTRATION PLANT.

BY GEORGE I. BAILEY, M. AM. SOC. C. E.*

AFTER the Water Filtration Plant had been installed by the city of Albany, we found that aside from the duty of commercially operating the plant and giving to citizens the best water at the lowest price, and to so operate it that the best sanitary experts of public health could find no fault, there was still another duty to be performed, more exacting, perhaps, than all the others. This duty was to keep correct records of all operations so that exact and precise information would be had.

We felt the need of such exact information when we first took up the question of water purification. The Albany Water Works are owned by the city, and it was the duty of the Water Commissioners to consider the matter of water purification, decide upon a method, and to present it to the city representatives in the City Council, together with facts and reasons that would convince that body that the recommendations made were proper, and also to give such information as would enlighten them, and show that the city's money would be spent wisely and well in the manner recommended.

The scarcity of reliable data and records was then felt. There were plenty of records, but very few gave comprehensive details. For instance, we found that the London, England, operating cost of filters was $1.24 per million gallons. We could not find out how this cost was divided, as the rate of wages and hours of work per day were not given, nor were the proportions of cost for removing ice, scraping filter beds, removing and replacing sand, washing sand, wash water used, distances and grades for moving material, nor any other incidental expenses that make up the total cost.

In other cases we found that certain percentages of bacteria and color were removed, although the original quantities of each were not stated, and information as to the rate of filtration, the amount of coagulant, the turbidity, and other details was lacking.

There was a decided scarcity of records of any kind concerning American or mechanical filters, although there was abundant evidence on the bacterial efficiency of English or sand filters.

There has been no recent investigation of the question of the method of filtration by any city where the matter has been gone into at all thoroughly without bringing into prominence the German standard of purity of water, viz., that not more than 100 bacteria per C. C. should be contained in the effluent from the filter, but to apply this standard to American results is misleading, because the methods of counting the bacteria differ in detail, and from a given water more bacteria are obtained than by the German procedure.

At Albany we have made perhaps fifty experiments, using in one case the German method, and in another our ordinary American method, and we find that the American method shows about twice as many bacteria as the German method, and therefore direct comparisons cannot be fairly made.

An important feature to be considered in water purification is the turbidity of the raw water. This one feature has more to do with the determination of the method of filtration to be used than almost any other, and yet it has been, until recently, comparatively overlooked, and the ordinary water works official has no comprehensive idea of its vital importance.

I shall present to you in tabular form and with such explanations as seem necessary, summaries of many of our records, but that you may better understand them a brief description of the plant is first presented. (See supplement.)

DESCRIPTION OF PLANT.

The source of supply is the Hudson River.

The method adopted is slow filtration through sand, sometimes called the English system.

The water is raised eighteen feet by pumps, and into a reservoir which acts as a settling basin.

The water passes from the reservoir through pipes to eight filter beds. These beds are arranged in two parallel rows, four filters in each row, and all open upon a central court which is between the two rows of filters. In this court the sand is washed and stored, and other incidental operations take place. Each filter bed is a rectangular masonry structure 258 feet long, 121 feet four inches wide, and contains 0.7 of an acre of filtering surface. The floor is water-tight and made of concrete. The whole structure is roofed with concrete arches covered with two feet of earth. The roof is carried by brick pillars twenty-one inches square and spaced thirteen feet eight inches apart on centers. The height from floor to roof is twelve feet six inches.

A collector drain, varying from thirty inches to twelve inches in diameter, is laid lengthwise through the center of the filter and underneath the concrete floor. Cross drains, six inches in diameter, laid with open joints in parallel lines thirteen feet eight inches apart, are placed on the floor and connect with the main drain.

About these six-inch drains is placed, first, a gravel varying in size from a baseball to a hen's egg, in such thickness that one complete layer shall cover the top of the drain; next, a gravel averaging the size of a marble was placed, covering the top of the drain about three inches more, and carried at this level throughout the bed; next, two inches more of gravel about the size of a pea was spread throughout, and finally a screened sand of proper size was filled over all to a depth of four feet, making a total depth of about five feet two inches of sand and gravel.

* Superintendent Bureau of Water, Albany, N. Y.

Supplement to the MUNICIPAL JOURNAL AND ENGINEER, July, 1901.

Tabulated Summary of Results Obtained by Albany Filtration Plant. (See page 16)

By GEORGE I. BAILEY, M. Am. Soc. C. E.

TABLE 1.—TOTAL DEATHS.

(From Records of Board of Health, State of N. Y.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1890	353	204	203	197	147	152	198	196	143	133	161	178	2265
1891	210	203	246	268	179	174	191	168	153	162	196	233	2383
1892	336	195	233	194	193	178	265	197	168	187	195	217	2558
1893	234	173	194	189	191	149	176	162	137	165	158	212	2140
1894	213	178	211	199	194	187	226	160	148	142	132	172	2162
1895	220	236	231	223	188	152	166	165	139	164	193	268	2345
1896	207	172	222	179	184	173	187	172	155	140	149	161	2101
1897	173	252	231	180	143	141	175	118	145	138	155	162	2013
1898	174	144	169	149	167	131	167	157	158	156	140	192	1904
1899	235	212	213	189	146	154	156	127	*135	*138	*138	*148	1991
Total	2355	1969	2153	1967	1732	1591	1907	1622	1481	1525	1617	1943	21862
Average	235	197	215	197	173	159	191	162	148	153	162	194	2186
1900*	135	146	180	202	152	112	162	116	125	144	135	133	1742

*Filter in operation.

TABLE 2.—DEATHS FROM TYPHOID FEVER.

(From Records of Board of Health, State of N. Y.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1890	13	5	4	6	2	5	1	7	6	3	4	6	62
1891	20	27	15	9	7	2	3	5	4	4	3	9	108
1892	4	5	7	4	1	0	3	4	3	4	10	5	50
1893	4	5	9	10	4	2	1	6	2	5	3	7	58
1894	7	5	10	3	4	6	2	6	3	1	1	4	52
1895	6	17	26	27	13	9	10	6	8	6	13	21	162
1896	25	12	17	4	3	6	6	6	9	5	3	1	97
1897	7	9	7	8	3	4	5	9	10	6	8	8	84
1898	12	8	8	4	3	1	3	20	12	5	7	11	94
1899	14	12	14	13	3	9	2	4	*2	*4	*0	*1	80
Total	112	105	117	88	43	44	36	73	59	43	52	73	837
Average	11	11	12	9	4	4	4	7	6	4	5	7	84
1900*	3	1	3	5	4	1	3	6	4	5	4	0	39

*Filter in operation.

TABLE 4.—SUMMARY OF BACTERIAL EFFICIENCY.

	Bacterial Count. Pure Water. Highest.	Lowest.	Average.	Raw Water. Highest.	Lowest.	Average.	Average Per Cent. Removed.
1899.							
September	29,300	10,200	16,800	800	244	343	97.6
October	21,000	2,500	10,700	267	37	142	98.6
November	21,000	3,400	9,200	115	35	71	99.2
December	80,200	16,800	45,800	450	96	213	99.4
1900.							
January	124,000	37,500	66,300	3,500	225	1,232	98.3
February	230,000	69,000	119,800	2,925	160	938	99.2
March	120,000	17,000	44,700	732	200	426	98.8
April	49,000	4,500	26,000	165	54	80	99.6
May	6,400	1,400	2,600	74	20	35	98.6
June	6,700	1,400	3,100	85	25	45	98.4
July	12,000	1,200	3,500	45	19	32	98.6
August	7,800	1,100	3,400	30	18	23	99.1
September	8,400	1,300	5,000	35	18	24	99.4
October	8,000	2,100	18,500	40	19	25	99.4
November	55,000	2,250	47,600	260	35	93	99.3
December	75,000	16,000	63,700	320	125	232	99.5

TABLE 4.—DEATHS FROM DIARRHOEAL DISEASES.

(From Records of Board of Health, State of N. Y.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1890	2	3	2	2	1	12	51	27	19	0	1	4	124
1891	13	2	1	1	6	15	46	26	16	11	4	9	150
1892	4	3	2	3	1	13	75	40	14	4	0	6	165
1893	6	5	10	3	5	8	30	18	4	1	4	9	103
1894	4	4	4	3	3	6	51	20	3	7	3	5	118
1895	9	16	13	11	3	9	28	28	6	8	7	9	147
1896	7	5	4	7	3	15	38	16	16	7	3	5	126
1897	5	11	7	5	2	7	27	13	10	5	10	5	107
1898	4	1	3	1	3	9	26	14	17	5	1	4	88
Total	57	59	54	41	28	105	386	215	115	50	33	57	1200
Average	6	6	5	4	3	10	39	21	12	5	3	6	120
1900*	1	2	5	1	0	7	27	16	5	5	1	0	70

*Filter in operation.

TABLE 6.—DETAIL COST, OPERATING FILTER BEDS.

Item.	Hours' work.	Per cent.		Total.	Unit cost. Per million gallons.	Per acre.	Per cu. yd.
Scraping	5,481	14.63		$1,532.70	$ .24	$12.37	....
Wheeling out	10,238	27.33		2,863.20	.45	23.11	$ .36
Refilling	7,437	19.87		2,081.66	.32	....	.37
Incidentals (50 per cent.)	3,009	8.03		841.25	.13	....	....
Lost time	2,365	6.32		662.10	.10	....	....
Washing	8,923	23.82	+ wash water.	2,722.40	.42	....	.48
Total	37,453	100.		$10,703.31	$1.66	....	....

TABLE 5.—GROSS COST, OPERATING FILTER BEDS.

Item.	Cost.
Labor	$6,131.63
Incidentals (50 per cent. of all)	574.92
Lost time	451.32
Superintendence (91 per cent. of all)	2,161.43
Supplies	552.25
" miscellaneous (84 per cent. of all)	604.84
Wash water	226.92
Total	$10,703.31

TABLE 8.—RUN OF FILTER BEDS.

Filter	Longest. Hours	Gals. 1-1000	Shortest Hours	Gals. 1-1,000	Runs	Total. Hours	Gals. 1-1,000	Average. Days	Hours	Gals. Bed.	Gals. 1-1000 Acre.
1	1,016	76,267	387	30,755	16	10,176	789,349	26.5	636	49,334	70,477
2	893	73,585	353	28,661	17	10,482	813,777	25.7	617	47,869	68,384
3	900	76,982	406	29,056	16	9,851	798,781	25.7	616	49,924	71,320
4	974	73,352	424	26,735	17	10,030	784,154	24.6	590	46,127	65,896
5	844	69,807	505	33,887	15	9,764	775,994	27.1	651	51,733	73,904
6	833	70,491	416	30,432	17	10,300	837,824	25.3	606	49,284	70,407
7	766	64,264	412	30,068	13	8,253	656,741	26.5	635	50,519	72,170
8	911	74,033	424	30,557	17	10,269	814,962	5.5	604	47,939	68,484
Totals and averages					128	79,125	6,271,582	25.8	618	48,997	69,984

TABLE 7.—DETAILS OF FILTER PLANT OPERATIONS: INCLUDING FILTER BEDS, CARE OF GROUNDS, PUMPING AND PUMPING STATION, AND LABORATORY.

Date. From	To	Scraping beds. Number of days.	Number of beds.	Hours.	Square yards.	Wheeling out. Hours.	Barrow loads.	Cubic yards.	Washing sand. Hours.	Barrow loads.	Cubic yards.	Refilling beds. Hours.	Cubic yards.	Barrow loads.	Engine room.	Labor—hours' work. Laboratory.	Incidentals.	Lost time.	Total.
1899.																			
7-26	12-30	137	28	1,317		2,415	25,179	1,190	2,071	18,262	850	1,631	18,556	850	608	172	584	567	9,365
1900.																			
12-30	6-30	182	49	1,914		4,073	46,523	3,700	4,257	43,949	2,643	3,473	41,040	2,643	1,456	198	2,725	1,329	19,425
Total		319	77	3,231	261,954	6,488	71,702	4,890	6,328	62,211	3,493	5,104	59,590	3,493	2,064	370	3,309	1,896	28,790
1900.																			
6-30	12-29	182	50	2,250		3,750	28,443	3,052	2,595	21,688	2,180	2,333	29,441	2,180	2,107	65	2,708	469	16,279
Total		501	127	5,481	432,054	10,238	100,145	7,942	8,923	83,299	5,673	7,437	89,031	5,673	4,171	435	6,017	2,365	45,067

Date. From	To	Paid—Pay roll. Labor.	Superintendence.	Chemist.	Paid—Bills. Pumping station.	Pumping station.	Filter beds.	Laboratory.	Miscellaneous.	Wash water, 12½ to 1 of washed sand.	Total cost.	Gallons filtered 1—100,000.	Average gallons filtered daily 1—1,000.	Cost per million gallons.
1899.														
7-26	12-30	$1,887.26	$528.65	$499.98								1,612.5	11,770	
1900.														
12-30	6-30	3,677.73	863.93	499.98								2,204.7	12,114	
Total		$5,564.99	$1,392.58	$999.96	$4,258.65	$4,298.53	$317.75	$245.15	$609.50	$139.72	$17,826.83	3,817.2	11,966	$4.67
1900.														
6-30	12-29	3,048.06	982.62	.499.98	2,429.70	3,845.59	234.50	144.50	110.54	87.20	11,382.69	2,645.8	14,537	4 30
Total		$8,613.05	$2,375.20	$1,499.94	$6,688.35	$8,144.12	$552.25	$389.65	$720.04	$226.92	$29,209.52	6,463.0	12,900	$4.52

Water is brought on to this bed to a depth of four feet. The water is then permitted to pass downward through the sand and gravel and into the under drains at an average rate of from four to five inches an hour, which gives a yield of 3,000,000 gallons per acre of filter in twenty-four hours. This rate gives the name "slow filtration." The water entering and leaving the bed is regulated by valves so that the quantity is always under control.

After the water leaves the filter it passes through a gate-house in which there is apparatus to show the rate of filtration; the friction head (which indicates the compactness and thickness of the sediment and bacterial scum upon the same), the level of the water in the filter, and the quantity passing through an orifice, which acts as a meter. From the gate-house the water is carried by pipes to a small covered pure water reservoir, into which all the filters empty, and from which it passes through 8,000 feet of steel riveted pipe forty-eight inches in diameter to the central pumping station, where it is pumped into the reservoirs and distributed to the city.

After the first pumping from the river into the settling basin all flow is by gravity through the different operations down to the central pumping station.

The purpose of the settling basin is to allow the heaviest particles in the water to deposit, and not be carried to the filter. When the water reaches the filter it passes downward through the sand, leaving the silt and bacteria in the sand, much the greater part being on top. The slow velocity regulates this so that even the finest particles and most of the bacteria are strained out and not carried down into the sand. To facilitate this straining the initial rate of flow through a new or freshly scraped bed is seldom more than 1,000,000 gallons per day, which is increased by from 100,000 to 200,000 gallons every four hours, and the full rate is not permitted until the thickness of the top layer creates a friction head of five inches, after which the full rate is maintained until the friction head is four feet, when the filter is laid off for cleaning.

CLEANING THE FILTER.

To clean the filter the water is drawn down to about one foot below the top of the sand. The workmen are provided with wooden sandals five inches wide and eighteen inches long, which they strap to their shoes and which prevent their weight from depressing or cutting the sand. Each man is given a long-handled shovel, and with this he removes the layer of silt, taking up a layer approximately five-eighths of an inch thick over the whole bed and throwing it into convenient piles. Running planks are then laid, the sandals removed, and the scraped sand is shoveled into wheelbarrows and wheeled out to the sand washer, where it is washed and stored until we are ready to refill a bed. This bed is then raked to a depth of about one-half inch, then smoothed with a screed to facilitate the next cleaning, and the water is let in for another run.

After the original thickness of sand has been reduced from twelve to eighteen inches, the bed is refilled to the original height with the sand that has been washed.

RESULT ON PUBLIC HEALTH.

The true measure of the efficiency of a filter is the effect on public health, and the reduction of deaths from certain unmistakable water-borne diseases, as well as a general betterment in health conditions. The tables show comparisons between the year 1900, being the one calendar year that the filter has been in operation, with the previous ten years' records, although in the four last months of the year 1899 the filter was in operation, and the general average has the benefit of any decrease for those four months.

In making comparisons it should be borne in mind that the only general improvement in sanitary conditions in our city has been the installation of the Filter Plant, and all tables show a reduction in death rates co-incident with the operation of the filters.

In the monthly bulletin for December, 1900, issued by the State Board of Health of New York occurs the following:

"The number of deaths from all causes reported during the year * * * exceeds the mortality of 1899 by 6,647 and the average of the past five years by 8,000. The increase over last year has been in all the sanitary districts except those of the central and southern parts of the State.

"Typhoid fever was unusually prevalent in the autumn, causing 1,948 deaths, 350 above the average.

"Diarrhœal diseases caused the average mortality, notably increasing the late summer and autumn mortality of the rural parts of the State rather than the urban."

The above statements indicate then that there was an excessive mortality throughout the State, and that comparisons of the year 1900 with the average of previous years for this city does not give the advantage to the one year that rightly accrues to it. Notwithstanding this condition, we find that while the average number of deaths for ten years in Albany has been 2,186, the number of deaths for the year 1900 was only 1,742, a decrease of 444 deaths, indicating generally a better condition of health. (See Table 1 in supplement).

Typhoid fever and sewage polluted water are almost synonyms, still typhoid fever does come from other sources than an impure water supply, and in the present year in our city three deaths and about twenty cases have been traced to an impure milk supply. The general and common cause of it in cities and villages is, however, an impure water supply.

By the typhoid standard the Albany plant has been proven an immediate and certain success. The average yearly deaths from this cause for ten years (including four months of filter use) has been eighty-four. The number of deaths last year was thirty-nine. Of these thirty-nine, fourteen were unmistakably alien or imported cases, for which the city's condition is not responsible. In previous years, when an epidemic of typhoid has occurred up stream either in Troy or Cohoes, an increase of cases has occurred in Albany. The last year was an exception to this rule, and notwithstanding decided increases in both, Albany decreased 54 per cent. in its number of deaths. (See Table 2 in supplement.)

Another group is of "diarrhœal diseases." Diarrhœal mortality is not based upon so limited and direct causation as that of typhoid fever, which is only exceptionally due to anything other than infected drinking water, while in diarrhœal cases the mortality in early life is greatly affected by season, improper food, and the healthfulness of surroundings or lack of it. Water-borne filth germs are a cause as well; they have a greater vitality in water than the typhoid bacilli, and they reach the intestinal tract in the same way, and while diarrhœa and dysentery are not limited to the operation of such specific germs as are typhoid or cholera, they may be caused by any germs which attend the decay of organic matter. I think it fair that the filters should be credited with the decrease in mortality from this cause. The average number of deaths from diarrhœal diseases for ten years (including four months of filter use) has been 120. Last year the number was seventy. The decrease is therefore 42 per cent. (See Table 3 in supplement.)

BACTERIOLOGICAL AND CHEMICAL.

The customary method of judging the efficiency of a filter is by a count of the bacteria in the raw water and of those remaining in the water after being filtered, and thus obtaining the percentage of removal. This gives a quick knowledge of what is being done, and affords an opportunity for correction or changes and improvement in operation and manipulation. This method is a necessity, and a filter plant without it is like a ship without a rudder.

Table 4 shows by months the work accomplished, and that for the year the average bacterial removal has been over 99 per cent.

All stream waters contain substances other than the elements which form water. Some of these properties are in solution and can only be determined by careful chemical analysis. The results of such analysis, together with a full history of the surroundings of the stream, give a good knowledge of the potability and healthfulness of the water. Sand filters remove some of these soluble matters, and of the most objectionable of them the average removal has been found as follows, all quantities being given in parts per million:

Albumenoid ammonia—Raw water, .3053; filtered water, 1.566; removal, 49 per cent.

Free ammonia—Raw water, .1117; filtered water, .0245; removal, 78 per cent.

Carbonaceous matter, measured by required oxygen—Raw water, 6.10; filtered water, 4.35; removal, 29 per cent.

Color (platinum standard)—Raw water, .37; filtered water, .28; removal, 24 per cent.

The turbidity of the raw water, as measured by the platinum wire scale, averages .080. Practically it is all removed, and even when

the river is in its most turbid and oily condition, the filtered water shows only a slight opalescence, which when measured comes within the æsthetic limits determined by experts at Pittsburg, Philadelphia and Washington.

In addition to these determinations, counts of *bacteria coli communis* have been made to show their relative frequency in the unfiltered and filtered water. In the raw water *coli* was found in thirty out of thirty-two samples, the number of colonies varying from two to thirty-five, the average being nine. In forty-three samples of filtered water *coli* was found in only seven, five of these had one colony only, one had two colonies, and one had three colonies. The methods for making the count were as recommended by the State Board of Health of Massachusetts.

OPERATION COST.

Filter plants vary in arrangements and appurtenances. Some have to pump water upon the beds, as at Poughkeepsie, West Superior and Albany. Others get the water by gravity, as at Somersworth, Ilion and Lawrence. So far as the writer knows no American plant except Albany has a permanently employed chemist in charge. To make comparisons of cost, therefore, it is necessary that the expense should be divided to show separately the cost of filtering, the cost of pumping, and the cost of chemical work. The unit of cost is for 1,000,000 gallons of water treated.

The cost of filtering at Albany has been $1.66. Table 5 shows the gross cost of operating the filter beds, and Table 6 subdivides the cost and shows the proportionate charge for each of the operations, as, scraping, washing sand, refilling, etc. The gross cost for all operations, by approximately six months' periods of time, showing in detail all operations, is set forth in Table 7.

QUANTITY OBTAINED.

The run of a filter, that is, the number of days of operation and quantity in gallons obtained from the starting of a newly scraped bed to the time it is again necessary to clean it, is a most important item. The longer the run and the greater the quantity, the less the operating cost, as almost the only operating cost of a sand filter is the labor needed for cleaning. Table 8 shows the records at Albany, and that an average bed runs twenty-six days and furnishes seventy million gallons per acre. The turbidity, or the amount and character of the suspended matter in the raw water, plays an important part in this matter, although we have found that where a filter has been started with the ordinary raw water and the sediment layer has formed, giving a friction head of about one foot, and then followed with a very turbid water, that the run of a filter has not been greatly lessened. It is therefore in the start of a filter that greatest care must be taken.

The operating results of our filters have been satisfactory. Several engineers have accounted for these results by stating that we have picked men. I wish to say that we do not have picked men. We pay only the ordinary rate of wages, viz., $1.50 per day of eight hours, the same that is paid by contractors and other employers of labor. We only demand a reasonable day's work, but we insist upon getting it. Ward heelers and "pot-house" politicians, who want to draw pay and do no work, have learned that we have no use for them, and they no longer strive for a place upon our pay-roll. The result is that we have good active men, and there is no nonsense on either side.

A part of our success is due to the attention which we have given to details of the work. We have endeavored to improve not only the work of the men and to simplify it, but to furnish them suitable tools. On the start, for scraping, we used the ordinary straight-edged D-handled shovel. We learned that it lamed the backs of our men and they could not work to advantage. We abandoned those shovels for a long-handled shovel which would allow the men to keep in a more erect position, and to overcome the slower handling of the new shovels we widened its blade to twelve inches. With these shovels our men scrape more than one hundred square yards an hour.

In the running plank used for wheeling out scraped material, we found that to give a proper foundation and width we had to use two of the ordinary ten to twelve-inch wide planks, and then the service was not good. We had plank especially sawed fourteen inches in width, and one of these planks answers the purpose better than two of the others. They are placed as speedily as one of the other planks, and the time is therefore reduced one-half.

The ordinary wheelbarrows used were not acceptable. On the grades that our men had to go the weight was shifted on the men's arms instead of being carried on the wheel, and we therefore re-adjusted all the wheels, giving a proper distribution of weight, and saving the strength of our men.

In washing sand we had to wheel all the winter's accumulation from the storage bank up to the washer, and then it was fed into the hopper by shovel. To overcome this we devised a movable hopper, into which the men shovel direct. Water carries the sand to the washer and through it, and the men who formerly wheeled sand to the washer now wheel the sand away, and the output of the washer is increased 50 per cent.

Our success has been in no small measure due to having a thoroughly energetic foreman, a man who has labored himself, and who understands laborers, who plays no favorites, who changes the work of the men from point to point, so that they are not wearied out in the one employment, and thus keeps them in the best of condition.

SUCCESS OF MECHANICAL FILTER AT ELMIRA.

BY JAMES M. CAIRD.*

THE Chemung river is formed by the uniting of the Tioga and Cohocton rivers, nineteen miles above Elmira. The Chemung river is about fifty miles in length, and flows into the north branch of the Susquehanna.

The Tioga river rises in the coal district of Pennsylvania and has an average descent of seventeen feet per mile.

The Cohocton river has only a slight descent.

The slope of the Chemung river from Painted Post to Elmira is at the rate of 5.9 feet per mile; it then flows through the city of Elmira or three miles at the rate of 3.5 feet per mile.

The river is subject to severe floods; at times the water rises eighteen feet.

The area drained above Elmira, by the Chemung river and its tributaries is about 2,050 square miles.

RIVER WATER POLLUTED.

On examining the polluting territory of the river for a distance of fifty miles above Elmira, there will be found to be over 50,000 people in cities and villages, and over 15,000 people having direct sewage connections with the river.

The water always has a marked turbidity and carries heavy suspended matter.

The water of filtration at Elmira is taken from the river through a crib which is connected with a gallery; from thence it flows to the pumps.

The pumping station is equipped with two Worthington high duty pumping engines, of six and ten million gallons daily capacity. Only one of these pumps is used at any time.

The water is forced through a twenty-inch main to the filter plant, which is about two miles north of the pumping station.

The pumps lift the water 118 feet for delivery.

The filter plant, which is of the American or mechanical type, consists of eighteen Jewell subsidence gravity filters, 13½ feet diameter, outside measurement.

Each filter has an effective filtering surface of 113 square feet, or a total of 2,034 feet, which is equal to about one-half of an acre. The filters have been operated at the rate of 157,000,000 gallons per acre per day, thereby filtering over 7,500,000 gallons daily.

THE PROCESS EXPLAINED.

The process of filtration is as follows: The water to be filtered is treated with a solution of sulphate of alumina, this being done

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by gravity. The analysis of the sulphate of alumina shows it to contain H_2O. (water), 43.1 per cent., SO_3 (sulphuric acid) 38.4 per cent., Al_3O_3 (available alumina) 17.5 per cent. insoluble .3 per cent. Fe_2O_3 (oxide of iron) trace.

The alumina is dissolved in two tanks having a capacity of 1,700 gallons each.

From the dissolving tanks the solution is pumped to the distributing tank, which is at the top of the filter building; from this it flows by gravity to the supply main, entering it about thirty feet outside of the filter building.

The amount of solution which leaves the distributing tank is governed by wire rings.

The distributing tank is also equipped with a large overflow pipe which discharges into the dissolving tank. The distributing tank is always overflowing. The overflowing is used to keep the solution in the dissolving tank thoroughly mixed.

Repeated tests show that the specific gravity of the alumina solution is the same at the top and the bottom of the dissolving tanks.

The solution of sulphate of alumina is prepared by weight, the proportion being one part of alumina to twenty parts of water.

After treatment with the solution of sulphate of alumina the water passes to the subsidence basins, where it has about thirty minutes' subsidence.

The water then passes to the top of the sand, and after passing through the sand it is discharged into a flume, which conducts it to the filtered water or distributing reservoir.

The sand bed is about forty-eight inches in depth. The sand used comes from Red Wing, Minn., and is almost pure silica, the grains being nearly uniform in size and shape.

The mechanical analysis shows the sand to have an effective size of .56 mm. and a uniformity coefficient of 1.43.

BACTERIOLOGICAL TESTS.

Several bacteriological tests have been made at the filter plant since June, 1898.

A test of the subsidence basin (60 samples being taken) showed that it removed from 30.2 per cent. to 89.4 per cent. of the bacteria, the average being 69.8 per cent., from seven days' operation.

The general efficiencies of the filters, by months, follow:

Date.	Bacteria per c. c. Influent.	Effluent.	per cent. Reduction.	Alum grs. per gal.	Rate per acre.
June, 1898.....	2500	101	95.08	.45	99,000,000
July, 1898.....	3046	84	97.26	.53	91,300,000
Aug., 1898.....	1166	45	96.19	.51	97,800,000
Feb., 1899.....	4000	182	95.38	.47	66,200,000
Mar., 1899.....	7338	150	98.10	.96	83,000,000
Oct., 1899.....	1074	27	97.48	.81	94,300,000
Nov., 1899.....	11900	118	99.02	2.89	105,000,000
Mar., 1900.....	35580	79	99.82	3.16	73,000,000
Aug., 1900.....	578	20	96.47	.72	94,000,000
Sept., 1900.....	516	14	97.18	1.35	98,000,000
May, 1901.....	1848	23	98.43	1.38	107,000,000
Average	6322	76	97.31	1.20	91,690,000

EFFICIENCY OF THE PLANT.

Before March, 1899, the alumina solution was pumped directly into the main supply. This method proved to be very unsatisfactory as the fluctuations were too large.

With this new method of feeding the coagulant is applied with great uniformity.

Disregarding the results obtained before March, 1899, we have the following efficiency:

Date.	Bacteria per c. c. Influent.	Effluent.	per cent. Reduction.	Alum grs. per gal.	Rate per acre.
Mar., 1899.....	7338	150	98.10	.96	83,000,000
Oct., 1899.....	1074	27	97.48	.81	94,000,000
Nov., 1899.....	11900	118	99.02	2.89	105,000,000
Mar., 1900.....	33580	79	99.82	3.16	73,000,000
Aug., 1900.....	578	20	96.47	.72	94,000,000
Sept., 1900.....	516	14	97.18	1.35	98,000,000
May, 1901.....	1848	23	98.43	1.38	107,000,000
Average	8392	60	98.07	1.61	93,470,000

These results represent the efficiency of the filter plant in its present or perfected condition.

There has never been any free alumina in the effluent, the alkilinity in flood time being sufficient to decompose five grains of coagulent to the gallon.

The *bacillus coli communis* has always been found in the river water.

During a test made March, 1900, the influent was examined four times and the bacillus coli communis was found in all samples.

The effluent was examined six times with negative results.

Two c.c. of the influent and fifty c.c. of the effluent were used for each test. The general efficiency during this test follows:

Bacteria per c.c.	Per cent. redt.	Alum grs., per gal.	Rate of filtration.
Raw 35,580, filtrate 79.....	99.82	3⅛	73,000,000

The tests for the *bacillus coli communis* used were:

Gas, about 50 per cent.; acidity of bulb; ratio of H. to Co.; "Indol" reaction; reduction of nitrates to nitrites; motility; colony non-liquefying.

OTHER TESTS MADE.

The quantitative bacterial method of examinations were as follows:

Culture media.—Mutrient gelatine was used—one pound beef; 100 gms. gelatine; 10 gms. peptone; 5 gms. common salt being used to make one litre. The reaction used was + 15 acidity. This reaction was found to give the maximum growth.

The bacteria are cultivated from three to five days, at 20 degrees C., the time varying with the seasons.

The plating is so arranged that not more than 300 colonies are in a plate. Beginning with the year 1895 a very careful record of the typhoid fever cases has been gathered under the direction of Dr. H. D. Wey, health officer.

The population of Elmira is about 35,000; it is estimated that 20,000 use the filtered water, which leaves 15,000 having wells for their supply.

THE TYPHOID RECORD.

The total number of cases of typhoid fever in Elmira for three years before the filters were put in operation was 629; total number of cases during three years' operation of the filters was 284. This makes a reduction of 60 per cent. in the total number of cases.

The cases by years and the water they use follows:

TYPHOID CASES BEFORE FILTERS WERE IN OPERATION.

Date.	Total cases.	Using city water.	Using well water.	Imported.
1895	107	21	27	59
1897	83	43	32	8
1896	439	287	123	29
Totals	629	351	182	96

TYPHOID CASES AFTER FILTERS WERE IN OPERATION.

Date.	Total cases.	Using city water.	Using well water.	Imported.
1898	76	38	35	3
1899	75	29	45	1
1900	97	42	47	12
Totals	248	109	127	12
Difference	381	242	55	84

From the above figures it is seen that there has been a reduction of over 68 per cent. in the cases of typhoid fever among the users of filtered water.

There has been a reduction of only 30 per cent. in the cases of typhoid fever among the users of well water.

During the last three years there have been 109 cases of typhoid fever among the 20,000 users of filtered water, while during the same period there has been 127 cases of typhoid fever among the 15,000 users of well water.

It would seem that the greater number of cases of typhoid fever was among the users of well water.

The results obtained from the purification of the Chemung river at Elmira, N. Y., are most gratifying.

ELECTRIC CENTRIFUGAL DEEP WELL PUMPS AT MOSCOW.

Plant With 45,000,000 Daily Capacity Costs $21,000,000—Low Per Capita Consumption in Russian City—Water Purified by Ozonized Air.

BY NICHOLAS SIMIN, C. E.*

M. SIMIN.

THE population of Moscow is about 1,000,000. The city has an area of about thirty square miles. A public water supply was introduced in 1779, drawn from springs a number of miles from the city. In 1890-2 driven wells were put down in the vicinity of the springs. A pumping plant was erected and water was forced through a 24-inch main eight and a half miles long to an underground reservoir of 3,250,000 gallons capacity. From this reservoir the water is again pumped to elevated reservoirs in the city.

LOW WATER CONSUMPTION.

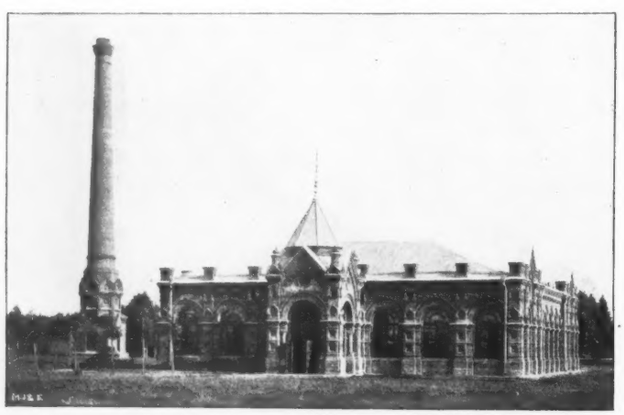
The water consumption of Moscow in November, 1900, was only 5,000,000 gallons a day, but about that time sewers were put in use. When the sewers are completed a consumption of 56,000,000 gallons is expected. Reliance will be placed on the springs and wells for 11,000,000 gallons a day and 45,000,000 gallons more will be taken from the Moscow River and purified.

To increase the yield of the twenty new 16-inch wells a centrifugal pump will be placed in each and driven by direct-connected motors, located in pavilions over the well. Of the twenty pumps six will be held in reserve. The centrifugal pumps will deliver water into four equalizing reservoirs, from which pumping engines will force water to the underground reservoir already mentioned.

The new river water supply was begun in September, 1900. It will be built in four sections, each having a capacity of a little over 11,000,000 gallons a day. Experiments on a working scale, beginning with a 3,000,000-gallon slow sand filtration plant, will be made to determine the system of purification best adapted to the river water.

WATER NEEDS PURIFYING.

No surface water can be accepted as certainly and absolutely free from pathogenic or disease-producing bacteria, and even the best filters fail to retain all the bacteria present in water. Not every human organism yields readily to the influence of pathogenic bacteria.



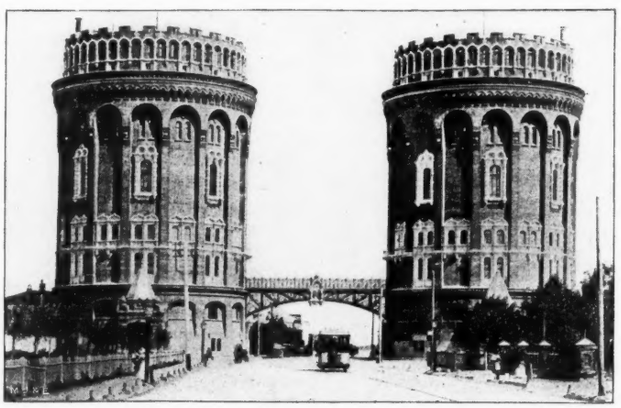
POWER STATION OF MOSCOW WATER WORKS.

Dr. Pettenkofer survived the drinking of water containing cholera bacilli; but no one can be certain that he is immune. Boiling the water will kill the bacteria, but will not remove or destroy their organic remains, or vital products; and this method of sterilization is not practically applicable to the large quantities involved in public water supplies.

Scientific investigations during the last few years have placed in the hands of water works engineers a new method of water sterilization by means of ozone. This method is based upon the following fundamental principles: (1) Ozone burns all organic matter with which it comes in contact in the water, including the bacteria and their vital products. (2) With water which has been previously freed of suspended matter, the destruction of the bacteria by means of ozone is equally efficient, no matter how great be the number of bacteria in the water; and the pathogenic bacteria are among the first to be destroyed.

OZONE USED TO PURIFY WATER.

For the sterilization of water, not pure ozone, but ozonized air, is used, containing from five to ten milligrams of ozone per litre. In the purification of water by ozone, which is simply a development of, and an improvement upon, the ordinary aeration of water by means of atmospheric air, the air, before coming in contact with the



TWIN WATER TOWERS OF MOSCOW.

water, is subjected to a series of electrical discharges, which convert a part of the diatomic (or two-atomic) oxygen (O_2) of the air into triatomic (or three atomic) oxygen (O_3), which is ozone, and which is remarkable for its power of oxidizing organic matter, including the bacteria in water. Care is taken either to avoid heating the air by the discharge or to cool it afterward, for a high temperature would cause the ozone to revert to its diatomic form.

PRINCIPLES GIVEN.

The scientific principles of water ozonization have been ascertained during the last ten years by authoritative scientists in Germany, France, Holland, and Belgium, who investigated the subject not only in the laboratory, but also on an industrial scale, and who thus solved the problem of the ozonization of large quantities of water for public supply. The writer has inspected the practical operation of this process at the Pasteur-Institut, Lille, and at the plant of Siemens & Halske at Martinicanfeld, Berlin, and has acquainted himself, also, with the works of purely scientific authors on the subject. As a result of these studies he feels assured of the soundness of the following conclusions: (1) Public water supplies cannot be absolutely protected from contamination by pathogenic bacteria. (2) All bacteria in water may be destroyed and oxidized by ozonized air. (3) The method of ozonization should find a large application in connection with public water supplies. In small quantities the cost of ozonization does not exceed one centime per cubic metre of water (about $6.25 per million gallons). With large plants, the cost will, of course, be considerably less. The construction of the plant is simple and inexpensive. The economic aspect of the process, therefore, offers no bar to its extensive development.

* This paper was prepared by Mr. Nicholas Simin, Chief Engineer of the Water Works of Moscow, Russia, and was read by Mr. John C. Troutwine, Jr., Assoc. Am. Soc. C. E.

WATER MADE COLORLESS AND ODORLESS.

Ozonization oxidizes not only the bacteria, but all other organic matter. It renders the water colorless, sparkling, and odorless, and gives to it an agreeable and refreshing taste, while it introduces into the water no foreign matter except oxygen, which is unquestionably beneficial.

The efficiency of the process is well shown by the experiments of Dr. Ohlmuller, among which we may note the following (a) A water containing, per cubic centimetre, 3,717,000 Milzbrandsporen (spores of the bacterium of inflammation of the spleen) was fully sterilized by ten minutes' contact with air containing from 6.3 to 15.2 milligrams of ozone per litre (of water). (b) A water containing 12,247,000 typhoid bacteria per cubic centimetre was sterilized by ten minutes' contact with ozonized air. (c) A water containing 2,721,000 cholera bacteria per cubic centimetre was sterilized by a similar treatment. Similarly brilliant results were easily obtained by all other investigators, when a sufficient strength of ozone was used. Inasmuch as the process oxidizes not only the bacteria, but also the organic matter, which might otherwise furnish them with food, the water remains sterile for many days or even weeks after ozonization. On the other hand, free ozone is never found in the sterilized water, and, hence, there is no ground for apprehension of injurious chemical action upon waterpipes or receptacles.

TWO DISTINCT OPERATIONS.

The process comprises two distinct operations, each performed by a separate apparatus: (1) Ozonization of the air by discharges of an electric current of high potential in the ozonizer. (2) The intimate mixture of the ozonized air with the water in the sterilizer.

In the present state of electrotechnics the ozonization of the air presents no difficulties. The ozonizers of Tyndal (Schneller), of Marmier & Abraham, and of Siemens & Halske have demonstrated this fact. The sterilizer should be such as to permit the use of the process in existing works without involving fundamental changes in those works.

THREE KINDS OF STERILIZERS.

Up to the present time, three types of sterilizer have been devised as follows: (1) In Siemens & Halske's sterilizer and in the similar one of Marmier & Abraham the water falls like rain into a cylindrical or prismatic vessel four metres in height and filled with broken stone, between which it trickles downward in innumerable fine currents, meeting, and mixing with the ozonized air, which is introduced into the vessel at its base and is drawn upward through it. (2) In Tyndal's (Schneller's) sterilizer, the cylindrical vessel consists of a series of short cylinders of enameled cast iron, one metre in diameter and 0.5 metre in height, and solidly joined together by flanges. Here also the height of the vessel is four metres. Between each two of the short sections is placed a diaphragm of celluloid, perforated with many small orifices. The orifices are "staggered," so that each orifice has solid metal over and under it in the adjacent diaphragms. This necessitates changes in the direction of the streams of water and of air in passing from each diaphragm to the next. Both the water and the ozonized air are introduced into the vessel at its base, and move upward throughout its length, and in doing so they occupy its entire area of cross section. (3) In the apparatus of Otto, the water undergoes a double process of sterilization—in each case, however, by the same ozonized air. The water, under a certain head, enters a series of ejectors, called emulsators, into which the ozonized air is also drawn, and in which an emulsion of water and ozonized air is formed. The emulsion then passes into a special receiving tank, where it parts with its air, and whence the water passes into a tall cylindrical vessel consisting of a series of pans, placed one above the other. The emulsion overflows from each pan into the one next below, while, at the same time, the ozonized air, liberated from the water in the receiving tank, is introduced into the cylinder at its base, and passes upward from pan to pan, meeting, and again mixing with the water on its way. The sterilized water is collected in a reservoir at the base of the cylinder. Instead of the cylinder with its pans, Dr. Otto uses also a stoneware cylinder made up of a series of short sections; but the principle of the operation is the same in each case. The Tyndal sterilizer has this advantage, that it avoids the loss of head due to sterilization. It thus contributes to the economy of the process and, consequently, facilitates its introduction. Again, the tall single cylinder may be replaced by several shorter ones, which may occupy a portion of an existing clear water reservoir. In the writer's opinion, the practical success of the process depends largely upon the efficiency of the sterilizer.

METHOD SCIENTIFICALLY ESTABLISHED.

For evidence of the substantial scientific foundation upon which the process rests, the reader is referred to the abundant literature of the subject. The writer, having witnessed its results, is no longer in search of proofs of its efficacy, but is interested chiefly in the development of the best form of its application. At the fifth convention of the Russian Water Works Association, held at Kieff in April of the current year, the writer read a paper on "The Ozonization of Water as a Means of Supplying the Deficiencies of Filtration in Water Works." After the reading and discussion of the paper, the convention resolved, that "in the present state of water ozonization it is desirable that experiments upon the application of the river and surface water be made in Russia." In the United States of America, where water supply and the use of electric power have received so colossal a development, the conditions are most favorable to the application of the process. The necessary preliminary removal of the suspended matter can be readily accomplished in the American rapid or "mechanical" filter by using only a small quantity of coagulant, sufficient for mere clarification.

FIRST CONVENTION OF PENNSYLVANIA CITIES.

THE first annual convention of the League of cities of the third class of Pennsylvania was held at Erie, June 26th, 27th and 28th, 1901. This association sprang into existence through the personal efforts of the Hon. John Depinet, Mayor of Erie, at whose call a preliminary meeting was held last year and a permanent organization effected, with Mr. Depinet as its first president.

An excellent programme was carried out. Some of the subjects presented and discussed were as follows: "Street Cleaning," by Joseph C. Kane, Esq., Pittsburg; "The Police Department: Its Needs and Efficiency," by Hon. James L. Schaadt, Mayor of Allentown; "What We Are and What We Ought to Be," by Henry A. Clark, Esq., ex-city solicitor of Erie; "The Tramp Nuisance," by Hon. E. F. Giles, Mayor of Altoona; and "The Bidder and the Municipality," by Mr. Thomas R. Crowell, City Engineer of Lebanon.

ALABAMA CITIES SWING INTO LINE.

As a direct result of the meeting of the League of American Municipalities at Charleston last December, the cities of Alabama have been organized into the League of Alabama Cities, to affiliate with the national association. Mayors Drennen, of Birmingham, and John B. Weakley, of Florence, are responsible for issuing the call to meet at Birmingham the latter part of last month.

The permanent officers were elected as follows: President, John B. Weakley, Mayor of Florence; vice-president, E. B. Joseph, Mayor of Montgomery; secretary, W. M. Drennen, Mayor of Birmingham; treasurer, T. T. Huey, Mayor of Bessemer. The first annual convention, at which the various problems confronting the city officials of Alabama will be discussed, will be announced at a later date by the president and the executive committee.

CATHOLIC TEACHERS MAY RECEIVE PAY.

JUSTICE RICH has denied the application of the American Protective Association for a temporary injunction restraining the payment of school money to teachers in a Catholic orphan asylum. The injunction was asked on the ground of constitutional and statutory violation. The Justice decided that the constitution was not violated in that the asylum was a pubic school, or it supplied the same instruction the common schools gave to more fortunate children. Therefore, the State should pay for this instruction just as it pays for that in public schools.

SENATOR EARLE'S GOOD ROADS TRAIN MOVES.

SENATOR EARLE.

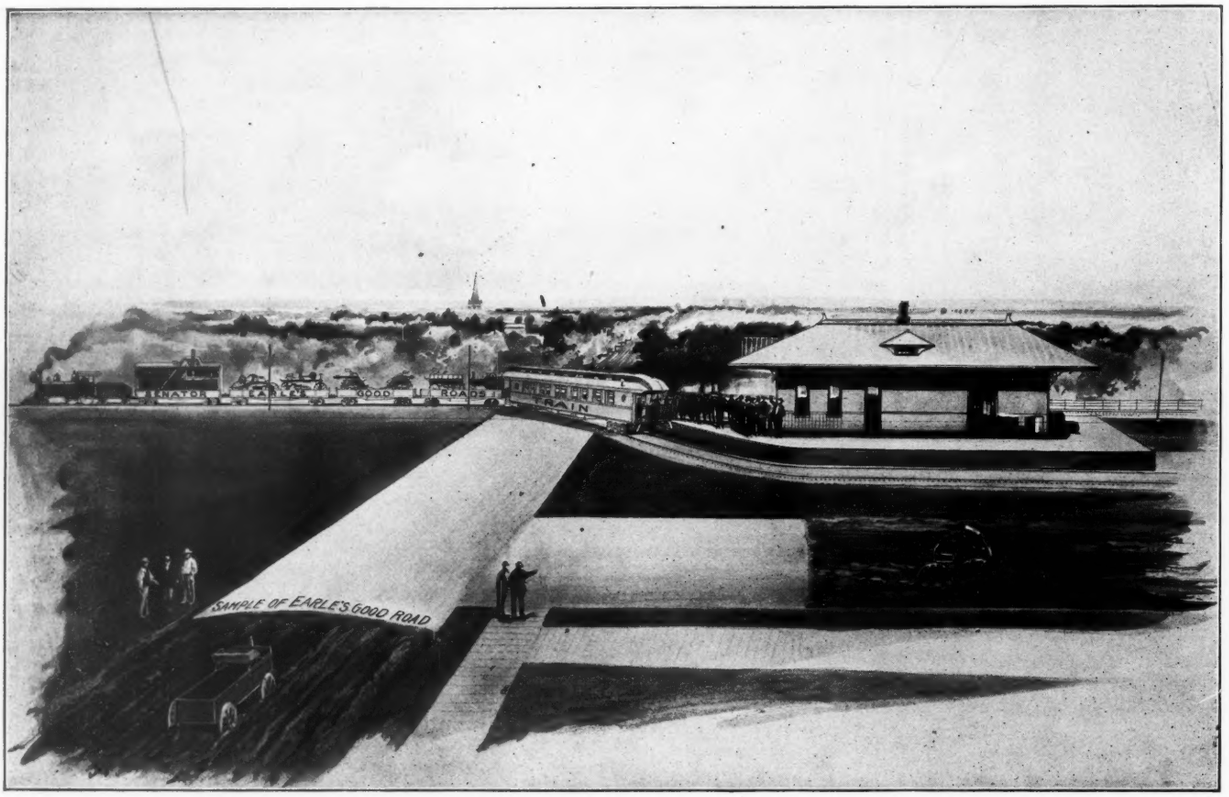
To State Senator Earle, of Michigan, belongs the credit of suggesting the actual demonstration of good roads by sending a good roads train about the country to show the people how to build roads. If he had not been actively engaged in his legislative duties his train would have been started long ago, but owing to this fact others have appropriated the idea and started a good roads train ahead of his own. The Senator expresses pleasure that the idea has been copied and hopes that still others will take it up, for all that he desires is the rapid dissemination of the "gospel of good roads" and he thinks the good roads train affords the most effective method.

Senator Earle's train will leave Detroit, early in July, equipped with all the modern machinery used in the construction and maintenance of good roads. The most convincing speakers will accompany the train and they will preach the gospel of better highways wherever the train goes. These advocates understand that Rome was not built in a day and that neither were the splendid highways of Europe constructed in a year. But they maintain that now is the time to commence a systematic improvement of the roads of the United States. There is only one thing lacking to a general bettering of the present deplorable condition of the common dirt roads, and that is the will of the people. The Yankee spirit which dominates the American people enables them to appreciate a good thing when they see it and, therefore, it is expected that th good roads train will make more converts and produce better results than anything else which could be done.

A good sized train, which will include ten car loads of machinery, is already made up waiting for the signal to start. A corps of expert road builders will be included in the outfit, which will insure the construction of the samples of road on scientific principles.

Canada has a train in preparation, but with greater advantages, inasmuch as the Government has appropriated a million dollars to be expended in bettering the roads of that region. Thus far the United States Government has not done anything worthy of mention in this direction, in fact it may be said to its shame that the officials in charge of the department for the improvement of roads in this country have been obliged to rely almost wholly upon their own resources or generous hearted philanthropists in promoting the work. Senator Earle thinks the time is ripe for this great Republic to make a liberal appropriation to the cause of good roads, and he expects to bend all his energies to the attainment of this end, but he strongly hopes and asks for the hearty co-operation of all people who may be in sympathy with the movement.

It is the earnest hope of Senator Earle that the good roads movement will be enthusiastically taken up by every State in the Union. And there is much evidence in support of the belief that his hope will be fully realized. Nineteen States have either held or are to hold State conventions to boom the movement for good roads, during the year 1901. State Engineer Bond, of Albany, N. Y., has suggested to the managers of the Pan-American Exposition that they do something for the cause. Accordingly, arrangements for another National gathering, to convene at Buffalo some time in September, are being rapidly perfected. This monster National mass meeting will in no way interfere with the work being done by either the State or National good roads associations. Much thought and attention is being given to that portion of the programme which deals with modern road-making machinery, and it is expected that there will be the largest exhibition ever known of this kind of machinery at the Pan-American, in connection with this meeting. The Charleston Exposition, which will open in December, will do much to further the cause in the South. The managers are making strenuous effort to have the good roads feature among the most prominent and helpful.



SENATOR EARLE'S GOOD ROADS TRAIN.

A SOUTHERNER TELLS WHAT GOOD ROADS MEAN.

The Economy of Good Roads—Good Methods Employed in Massachusetts and New Jersey—North Carolina Leads in the South—Tennessee's Defective Law—Governmental Aid Needed.

BY COL. J. B. KILLEBREW.*

THE question of good roads is so broad in its scope, so important in its consequences, that I scarcely know where to begin. I shall not discuss the necessity of good roads, for every man knows their value. It is estimated by competent publicists that $600,000,000 are expended annually by the farmers of the United States in moving $2,500,000,000 worth of produce over bad roads to railway stations and to markets. This is a tax of 24 cents on every dollar's worth of produce that goes to market. It is further estimated that at least one-half of this may be saved by the use of good roads, or say $300,000,000 annually. Looked at from this point of view, it is a question of more vital importance to the people of the State than any other now entering into the policies of the two great parties.

ECONOMY OF GOOD ROADS.

How shall we secure good roads? How shall we save the immense sum now being worse than wasted? Manifestly it will require a great outlay, but the outlay will not be greater than we are now paying without receiving any benefits whatever. Take the amount we now pay by reason of bad roads and apply it to the building of good ones and we will have an investment that will yield greater returns to the many than any other that can be made. This improvement of our roads ought to be done by the States, by the counties, by the districts, by individuals, by the general government or by the united action of several or all of these agencies. If this work is to be done by appropriations of the Legislature, these appropriations must be made on a liberal scale. Our own State appropriates nothing directly for this purpose, because prohibited by the Constitution, but authorizes the counties to do so. Some counties levy a few cents on the hundred dollars, about enough to pay the salaries of the officers intrusted with the management of the fund. A certain number of days' work is also levied, running from five to eight, and those upon whom this tax of labor is levied usually have the least interest in the betterment of the roads and work in a perfunctory manner so as to discharge as easily as possible the obligation. Districts may not levy a tax under the Constitution of the State of Tennessee, however much they may desire to do so. Under the operation of our road laws there is enough waste of time and money to build a section of good roads every year if it was all levied in money and its expenditure properly directed by competent road builders. But it may be set down as certain that we will never get good roads under our State laws unless these laws provide for a tax by the State, by the counties, by districts and on the individuals mostly benefited by the construction of the roads.

HOW NEW JERSEY DOES IT.

The New Jersey law is well worth a trial in the Southern States. It provides that the roads of a township be placed under the management of the township committee, and money may be raised by township bonds for grading, macadamizing and improving the same; bonds to be authorized by vote of the annual town meeting.

The board of chosen freeholders of any county may designate certain roads as county roads and improve the same by the issue of county bonds.

The State shall pay one-third of all cost of road improvement so authorized by the chosen freeholders, within certain limitations.

Whenever the owners of two-thirds of the lands fronting on any public road will undertake to pay one-tenth of the cost of improving such road it is the duty of the board of chosen freeholders to cause such improvements to be made.

All road taxes are paid in money.

Under the operations of this law New Jersey has built more good roads in proportion than any other State in the Union.

IN MASSACHUSETTS.

The Massachusetts law is also worthy of study. It provides: That the Governor and Council appoint three commissioners at a salary of $2,000 each and traveling expenses. Commission to compile statistics, make investigations, advise regarding construction, alteration and maintenance of roads, prepare maps showing location of road materials, and hold a public meeting in each county for the discussion of road matters at least once a year.

Upon the petition of county commissioner the commission may adopt any road as a State highway and construct the same if the Legislature makes appropriation therefor, except that the grading and bridging shall be done by the county. Such highway to be maintained by the State under supervision of the commission.

Upon petition of two or more cities or towns a connecting road, new or existing, may be made a State highway and constructed in the same manner.

NORTH CAROLINA'S METHOD.

The people of the South want good roads, but they cannot get their consent to pay for them. North Carolina is taking the lead in this matter. In whatever county the citizens of that State have built one good road the example is contagious and other good roads follow. In Mecklenburg County many good macadamized roads have been built. The city of Charlotte in that county has built ninety miles of good roads at the cost of $250,000 and has profited by the expenditure. The average cost, according to Prof. Holmes, the State geologist, is $2,000 per mile. Their width near the city limits is forty feet; beyond thirty-six feet. They have a maximum grade of four feet in 100. Sewer pipe is used for drainage. Strong wooden bridges with stone piers are put wherever needed. Upon graded and settled earth a macadam road is made twelve feet wide and nine inches thick. The earth is excavated from four to six inches deep and the bottom rolled with a steam roller. A layer of field stone is placed on this four inches thick and rolled, then a three-inch layer of crushed stone from one to two inches in size is put down, and lastly a layer two inches thick of fine crushed stone, including screenings, and the whole firmly rolled. Convict labor does most of the work. The cost of this labor varies in the State from twenty-two to forty cents per day, which pays for food, clothing, medical attendance, guards, etc. One superintendent and one engineer have charge of the work of each squad of eighty men or more. The rate of taxation for road purposes in Mecklenburg County was eighteen cents on the $100. In addition to this tax each township or district levies a tax of from seven to fifteen cents on each $100 worth of property. All able-bodied citizens along the road must work four days each year or pay fifty cents per day in lieu thereof.

TENNESSEE'S DEFECTIVE LAW.

Our recent road law is singularly defective in many particulars. It throws the whole burden of keeping up the highways upon the country districts. Is this right? Are not towns and cities as much or more interested in having good roads than even the country? Good roads make flourishing towns. Greensboro, in North Carolina, has recently voted to build fifty miles of good roads near that city as an object lesson so as to induce the country people to vote a larger road tax.

There would not be a country store at every convenient position if the roads leading to the cities and towns were of high grade. Towns should be taxed for they are the recipients and beneficiaries of all the trade that passes over the roads. The Constitution should be so amended that the State could supplement the county tax for building roads. No tax now paid would work a greater benefit to the people. It is a hard matter indeed to pay too much for good roads. They are the avenues of thrift and prosperity and they add many times more than they cost to the taxable property of the State. The towns in North Carolina are all taxed for building roads.

* The substance of an address delivered before the Goods Roads Convention, held at Jackson, Tenn., June 21, 1901.

There should be three taxes imposed for the making and working of roads, one on property, one on polls and one on labor. Property should pay at least three-fourths of the tax, for property is the greatest beneficiary whether it is held in towns, cities, or in the country. It is the greatest of injustice to throw all the burden of making and keeping up roads upon the people of the country.

ENGLAND AND FRANCE.

Two hundred years ago England had the worst roads in the world, because the peasantry living on the roads alone were required to work them. In speaking of them Macauley says, "that a route connecting two great towns which have a large and flourishing trade with each other should be maintained at the cost of the rural population scattered between them is manifestly unjust. It was not until many toll bars had been violently pulled down, until the troops had in many instances been forced to act against the people and until much blood had been shed that a good system was introduced." Every class now contributes to the maintenance of the road system in England.

The French have probably the most efficient laws and regulations in the world for the building and repairing of highways. The Minister of Public Works has the general superintendence of all roads and ways by land and by water. There are four classes of road recognized by law, namely: (1) national, (2) departmental, (3) military, (4) cross roads. National roads are built and kept up by the national treasury. Departmental roads are a charge upon the departments through which they pass, and part of the military roads are kept up by the government and a part by the departments through which the roads pass.

The cross roads are kept up by the communes, though sometimes in thinly populated regions these communes receive assistance from the government, especially when these roads become of importance.

The national roads are paved like a street, having an average width of 52½ feet. The departmental roads are thirty-nine feet wide, and the military and cross roads are of variable width. Piles of broken stone are placed at convenient distances and a man is constantly employed in repairing each section.

GOVERNMENTAL AID.

The General Government of the United States should aid in building the great highways, as was contemplated by the founders of the Government. In fact, the power given in the Constitution to establish postoffices and post roads might justly be construed so as to include all roads needed for postal service. Rural mail delivery will necessitate thousands of such roads through the country districts. Why should not the General Government aid in building them? How could the Government expend money that would do so much good to the people of this nation? Good roads would make the country more attractive and would tend to relieve the congestion of population in the cities. The greatest drawback to country life is the inability to move with ease from point to point, owing to the bad condition of the highways. Why cannot the Government make appropriations for the highways on land, as well as the highways on water? But few go over the latter, while millions go over the former. Congress votes subsidies to railroads, steamships and for mapping the seas of commerce. This is a very necesary and important work, but not more important than making the highways on land. We all know how anxious Congressmen are to get an appropriation in the rivers and harbors bill for the improvement of some insignificant stream in their state. How much wiser it would be to vote this appropriation for making some highway between two cities or between two states. Hundreds of millions of dollars have been wasted on streams that can never be made navigable which, if expended on our highways, would give us the best system of roads in the world.

Suppose the General Government should appropriate every ten years an amount equal to that now expended for pensions, say $150,000,000, for the building and improvement of the roads of the country. This would give, in round numbers, $2 per capita for the entire population of the United States. This continued for two generations would grade, macadamize and gravel every great public thoroughfare in the country when aided by local appropriations.

Who would begrudge the expenditure after such roads have been built? Who would not say that the expenditure was a wise one, elevating in its influences and adding immensely to the tangible wealth and commerce of the country? We paid more than this amount in the expenditures of the Spanish war. Is there a single person who would not receive a benefit from good roads far greater than he received from the Spanish war? Put it in another way—is there a single person now using the highways of the country, or whose business is in any way affected by the traffic on the highways of the country (and this touches the business interests of every man and woman in the United States), who would not be willing to pay as much for good roads as he has paid for the war with Spain?

BENEFITS DERIVED FROM THE MUNICIPAL LODGING HOUSE.

NEW YORK, Philadelphia, Boston, St. Louis, Washington, New Haven and other American cities have their municipal lodging houses or wayfarers' lodges, but none of them are conducted more economically than that which has been in operation in Syracuse for the past year or more. The actual results obtained in Syracuse have won the commendation of many citizens who, when the proposition was first broached, were strongly opposed to the establishment of such an institution.

DISCOURAGES THE PROFESSIONAL BEGGAR.

During the past year and a half not far from 75,000 tickets have been distributed among all classes of citizens, who, when they are asked for assistance on the street, give the ticket instead of money. The ticket is about the size of a small sized business card, and has printed upon it the following:

"John Hazeltine, Superintendent Municipal Lodging House, 113 and 115 Market street, opposite City Hall. Bath, Supper, Lodging and Breakfast for four hours' work." By the free use of these cards the professional beggar has been much discouraged, for work is not what he is looking after. On the other hand, the tickets have been of great value to the fellow who has some self-respect remaining; at any rate it does not degrade him by making him the recipient of something for which he is not allowed to give a quid pro quo.

PROFITABLE TO THE CITY.

That this method is profitable to the city is demonstrated by the report of the superintendent. In his report for the last fiscal year, Mr. Hazeltine says that "The number of night lodgers was 6,724, and the number of persons who worked an hour for a meal alone was 946. Together these worked on the streets 27,842 hours, which, at the regular pay for eight hours work a day, was $5,220.36, which the lodgers earned for the city. Adding to this the $621.75 received from the county, and the $376.35 yet to be paid, makes the total earnings of the Municipal Lodging House, $6,218.46, or $151.98 more than expenses."

COUNTY PAYS FOR NON-RESIDENTS.

The municipal law of Syracuse requires that the county shall pay for all non-residents who apply to the Lodging House for assistance. Every one is classed as a non-resident who has not been a resident of the city for one year. In order that a non-resident may avail himself of the privileges of the Lodging House he must procure an order from the Overseer of the Poor, which reads as follows:

"John Hazletine, Manager Municipal Lodging House, City of Syracuse. Give John Doe, a County Charge, two meals and one lodging, and charge Onondaga county forty-five cents. Richard Roe, Overseer of the Poor. Syracuse, June 21, 1901." In this way a perfect account may be kept with the county, and at the same time an opportunity is given to take care of the tramp element in a legitimate manner.

THE HOUSE LIBERALLY PATRONIZED.

The 6,724 lodgers were given 14,394 meals, and they were distributed through the months as follows:

January	771	July	252
February	670	August	374
March	778	September	413
April	520	October	611
May	432	November	708
June	349	December	846

LODGERS WORK LARGELY ON STREETS.

The superintendent has been very careful to assign the lodgers to the class of work that could in no way interfere with the employment of legitimate and regular labor. The rights of the man who will work faithfully and continuously are thoughtfully respected. For this reason the transient lodgers have been set to work on back streets, public alleys and back yards. Besides this, much work in promoting the sanitation and general appearance of the city, in the way of odd kinds of work, which no other administration of the city's affairs has ever thought of doing, has been performed by the guest of the lodging house.

SITUATIONS FOUND FOR UNEMPLOYED.

Several of the benefits accruing to the guests of this lodging house are the result, largely, of the initiative of the Superintendent. One of these is his earnest endeavors to find work for the unemployed in a permanent place. Nearly one thousand persons have been cared for in this manner during the last fiscal year, and they have been given permanent situations with farmers, contractors, quarrymen, livery stable men, choppers for the North woods, hotel keepers, and not a few women have been found positions as wash women, scrub women, dish washers, corn huskers, berry pickers and others too numerous to mention.

The Lodging House contains two cells to be used for caring for the insane. Up to the close of the last fiscal year only seven persons had been adjudged insane and were thus cared for.

THE NEEDS OF THE INSTITUTION.

"There are many things which are needed to increase the usefulness of this already successful institution, and the first is a permanent and suitable building," said Mayor James K. McGuire the other day. "Thus far the work has succeeded in spite of the drawbacks incident to a badly arranged and illy adapted building. It needs a structure detached from others, equipped with means for protection against the dangers of fire, and so arranged as to secure thorough ventilation and cleanliness in all parts, all of which are essential in this kind of work. There should be an outfit whereby all clothing worn by applicants may be thoroughly fumigated, and, if necessary, washed also, so that no lodger need take any clothing into the dormitories save such as will be clean."

This is the custom in the New York and other lodging houses. In these each lodger enters the basement, where his clothing is taken from him, put into a fumigator, and after being subjected to a degree of heat sufficient for the destruction of all vermin and germs, it is placed in netting bags and put away until the following morning. The man himself is thoroughly bathed, furnished with clean night apparel and conducted to one of the dormitories on the upper floor. Into this dormitory he takes nothing of his own, so that there is no danger of fire from matches or smoking. In the morning he is given his own clothing and discharged from the institution a clean man.

MAYORS TALK ON MUNICIPAL OWNERSHIP.

MAYOR CARTER H. HARRISON, CHICAGO.

"I AM a firm believer in public ownership of all municipal public utilities, whenever it is manifest that a city government is sufficiently advanced to properly control them. I believe that practically any city government can manage water, gas and electricity as well as it is done by private companies with greater public benefit resulting.

"In regard to street railways, I do not believe in municipal operation of them until a settled civil service system has been obtained and established. In the meanwhile and until such a civil service has been fully established in a given city, I contend that each franchise grant should provide for making the municipality a full partner."

MAYOR L. H. CHAPPELL, COLUMBUS, GA.

"You may quote me as favoring the municipal ownership of water works and lighting plants. These are necessities to every citizen and should be supplied in abundance at actual cost, using the credit of the municipal corporation to reduce interest charges to a minimum.

"I do not favor municipal ownership of street cars, for the reason that the operation of street cars does not extend to all parts of a city, nor are they confined to the city; but, on the contrary, they are in many instances, built and operated for the purpose of stimulating the development of suburban territory."

MAYOR T. W. HUGO, DULUTH, MINN.

"I am in favor of the municipal ownership of natural monopolies, such as public water supply, electric or gas light, street railways, etc., but with this limitation: That all these branches must pay, as any solvent business corporation would, all expenses in connection therewith, and at the same time contribute something to the general funds of the municipality, so that the rate of direct taxation may be somewhat reduced; and, also provided, that the money required to put these several branches into operation can be raised without unduly increasing the bonded indebtedness of the municipality, or imposing extraordinary burdens on the taxpayer in the shape of taxes. Further, I should say, that under any and all conditions, I am in favor of the city owning and operating its water supply system."

MAYOR JAMES L. SCHAADT, ALLENTOWN, PA.

"I believe in municipal ownership of the supply of water and electric or gas light to the public.

"I do not believe that such ownership should extend to street railways, etc."

MAYOR JOHN BLAIR, MARSHALL, MO.

"I am in favor of municipal ownership, because I believe that the city can own and operate all public utilities to a greater advantage to itself than can be done under private ownership."

MAYOR JULIUS FLEISCHMANN, CINCINNATI.

"Regarding municipal ownership in its general acceptation, that is a subject which requires a great deal of study, and to which I have not the opportunity to give the proper attention; hence, I do not feel myself competent to give an opinion upon the same. In this city we have found the municipal ownership of our water works plant of great benefit to the people, but I doubt whether the lighting plants or street railways could be operated by the city with equal success, the conditions being entirely different."

MAYOR J. E. SHATZEL, BOWLING GREEN, O.

"This city owns none of its public utilities, but there is quite a strong sentiment in favor of buying its water works plant. That is all.

"It seems to me you put your question in a way to make it hard to answer. To ask whether or not one is in favor of municipal ownership, allows one to answer yes or no with equal sincerity, for surrounding conditions and circumstances enter into the matter so largely.

"Taking this city, for instance, as an example, I should say, in reply to your question, 'yes,' as to water works and electric light, and 'no' as to gas works. I would so answer because our water and light may be furnished as they are now furnished, for an indefinite term of years and at no financial risk or hazard to the city. But I should say 'no' in regard to gas, because we are getting it at Lancaster, O., from a field that has a heavy drain upon its resources and is liable to give out at any time.

"I think towns and cities should supply themselves with water and light, for these seem to be staples. And anything else that may be put on a firm and stable basis might properly be made subject to municipal ownership, but I do not think that towns and cities should go into hazardous and supeculative ventures with the public money.

"The management of whatever public utilities a town or city may find practical to invest in, should be in the most competent hands obtainable; entirely independent of politics and political influence."

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NEW YORK, JULY, 1901.

IT has been maintained that asphalt would not stand the heaviest traffic as well as granite block, but the use of this pavement on Fifth avenue and certain portions of Broadway during the past three years in New York City has demonstrated otherwise.

THE practice of making any given brand of a product—such as cement or asphalt—the standard is thoroughly bad. The standard which should govern all tests of materials used in the improvement or maintenance of a city should be based upon scientific principles.

MUNICIPAL officers, including the Mayor, heads of departments and Councilmen, are adequately paid but in few instances. They should receive salaries commensurate with their duties and responsibilities. If our reform friends would improve the conditions in this particular, they would remove the power of temptation from many a public official, and would better civic conditions.

CITY ENGINEER BELL, who is in charge of the Water Works of St. Thomas, Ontario, has recommended that a conservatory be erected adjoining the engine room of the power house, to be heated with the exhaust steam and used for the purpose of growing and keeping plants and flowers to beautify the grounds in summer. This is a suggestion which it would be profitable for American cities to follow.

THERE is an alderman in Altoona (Pa.) who would make the use of water meters illegal. If he would only make a trip to a few cities where the benefits of the water meter have been fully demonstrated, and then to some of those which are still sitting in darkness he would change his mind. Anyone who talks against the use of the water meter in connection with a plant which pumps all the water used displays his ignorance.

A PRESS dispatch affirms that the Director of Public Works of Columbus (O.) has discontinued the minimum rate in the water department which was established by his predecessor a year ago. It is done upon the ground that it is a hardship upon the poorer classes to pay five dollars a year for such a service. The water department formerly sold water at six cents per thousand gallons, so that hundreds of people paid less than a dollar a year for water rent. Such a policy is ruinously foolish.

"No American city of 5,000 population or over need pay any city taxes, as today collected, with full ownership of all its public utilities," writes an editor of a Western paper. The greatest enemy which the cause of municipal ownership has today is the "friend" who makes such "tom fool" statements. That is an utterance fit for a lunatic. Even if it were possible, it would be the worst kind of public policy to have a taxless town. The burden of taxation should be distributed according to ability, but not removed.

THE progressive aldermanic body of Albany recently passed an ordinance appropriating a sum of money for providing seats for the small parks of the city, and now some benighted citizens of that town have presented a petition to the Mayor requesting him to veto the measure. If Mayor Blessing is the kind of an official he has shown himself to be on other occasions he will quickly attach his signature to the bill. It is a grave mistake not to provide seats in abundance for all parks; indeed, there should be seats along the streets where the space is broad enough to admit of them, as is the practice in foreign cities.

ELSEWHERE in this number will be found a long description of the Albany filtration plant, which gives unqualified approval of the efficacy of its operation. About the time this paper was received one of the Albany dailies came out with an article condemning a certain portion of the system, under the following headlines: "Unfiltered water too dirty to wash in. Unanimous condemnation of Albany's water supply furnished east of Pearl street—Residents wouldn't think of drinking it—Filters in universal use." Is sand filtration a failure? Some of the people of Albany say that it is, while the superintendent of the plant declares it a success in every particular. Which version is correct?

A PARAGRAPH has been going the rounds of the newspapers to the effect that Tom L. Johnson was something of a hypocrite for the reason that he was endeavoring to force the railroads and other corporations having property in Cleveland to pay taxes upon more than 15 per cent. of their valuation, when he was doing all within his power to reduce the valuation of his immense steel plant in Lorain. We are informed by the Mayor of Lorain as well as by Mr. Johnson that he has had no interest in that steel plant for more than two years. It is only just to make this explanation, and further state that those who are the most intimately acquainted with Mr. Johnson assert their belief not only in the sincerity of his purpose, but also in the consistency with which he is carrying it into effect.

SOME city officials adopt the unwise policy of exempting certain manufacturers who will move into their community from taxation, thinking thereby to increase the commercial prosperity of the city. It is a bad practice and does not yield permanent results. The better way is to beautify the city, by the planting of trees and the laying out of parks, the improvement of streets and sanitary conditions, the betterment of public schools and libraries, and then advertise the improved civic conditions by entertaining national, state and county conventions. Such visitors would be sure to see, appreciate and talk about the beautiful appearance of the town, which would often lead them to remove to so favored a place. Multiply the privileges of the general public in your city and you will increase its population and prosperity.

THE Governor of Pennsylvania took a forward step recently under protest—it was when he signed the voting machine measure which grants to the people the privilege to vote upon the question whether the voting machine shall be substituted for the present method of voting. Although he signed the bill, yet he gave his reasons why such a bill should not become a law. Among the arguments which he advanced were, that the adoption of such a measure would increase the expense of elections, and that no device, however perfect, could make a dishonest man honest. The facts in the case do not bear out his assumption. The city of Buffalo paid five hundred dollars apiece for one hundred and ten machines, and it has already been demonstrated that they will soon pay for themselves because there is much less expense entailed in recording the will of the people by the voting machine than by the old method. Moreover, the dishonest man, for the time being at least, is made absolutely honest, because it is an impossibility for him to cheat the voting machine; but he can and does cheat in using the old method.

THE question of "no seat no fare" is being agitated—but not with serious intent—by some of the New York aldermen. Street railways should be made to provide an adequate number of cars for the rush hours of the day. If Mayors and Councilmen will look up the legal status of the question they will find that if seats are not provided for all passengers it gives a just cause for annuling the charters and franchises of such corporations.

MAYOR CARNAHAN, of Rochester (N. Y.), is right in maintaining that conduits for the placing of all wires underground in a city should be constructed, owned and operated by the municipality. To give rival electric light and power companies, also telephone and telegraph companies, the right to construct and maintain such conduits would keep the streets in a constant state of upheaval. The life of the modern city is becoming too strenuous and too congested to permit of such conflicting privileges.

SOMETHING WRONG ABOUT CROTON DAM.

THE Aqueduct Commissioners of New York, at the suggestion of Chief Engineer Hill, have passed a resolution which calls for a thorough examination of the work which has been performed thus far on the Croton Dam, and also upon the Jerome Park Reservoir, by three expert engineers who are not now connected with the construction work in any form.

The Chief Engineer and the Commissioners refuse to give out for publication just what has been the nature of the discovery, which calls for so radical and expensive a step. That something of considerable importance in the way of defective plans, or work thus far performed, has come to light is more than likely, or otherwise an engineer of Chief Hill's experience would not call for expert opinion. The experts will be required to examine with the utmost care not only the present plans for the construction of the dam, but the work thus far performed, together with the core-wall and embankment of the Jerome Park Reservoir, which is of somewhat similar construction. They will also be required to report what alterations or modifications, if any, should be made in present plans for the construction of the dam and reservoir.

If there is something vitally wrong in the plans or in the construction of this important public improvement, the sooner the fault is discovered the less expensive it will be for the city to remedy. It seems strange, however, that in an improvement of such gigantic proportions, one which involves so large an expenditure of money, in a field which is capable of such absolutely perfect forecasting as to method and manner of construction, there should creep into the plans an error of such implied serious import as indicated by this proposed investigation. Slight modifications are inevitable in an engineering project of such proportions, but anything of a more extended nature would indicate that some one has blundered. That the request for an examination should emanate from the Chief Engineer, who has only been in charge for a little more than a year, shows a commendable fidelity to the interests of New York City which should not be without its reward.

A MUNICIPAL PIRATE.

THE pirating of Captain Kidd upon the high seas was but child's play as compared with that of the Chief Executive of Philadelphia in lending his aid to the stealing of fourteen valuable franchises, franchises for which an offer of $2,500,000 was spurned. This act of Philadelphia's Mayor has brought the blush of shame to the face of hundreds of his brother mayors throughout the United States. This betrayal of trust was an act which will be generally resented by city officials outside of the Quaker City, because it is such deeds that bring city officials into disrepute.

The brazen nonchalance with which the Mayor contemptuously receives the protests of a few indignant citizens, is only equalled by the unprecedented boldness of his act in signing away the city's rights to franchises valued at millions of dollars. The unanimity with which the ordinances were railroaded through Councils is indisputable evidence of the almost all-inclusive corruption of the civic administration of Philadelphia.

There are a few faithful ones, however, who form the basis for a hope of better things in store for the city. It is greatly to the credit of John R. McClean, Jr., a member of the Councils, that he had the courage to offer the following protest even though he was sure of its futility:

"I defy any man in this chamber to prove that he ever heard of these bills prior to two weeks ago. The first I heard of them was only a week ago. I see men now before me voting for these bills who, in other and better days, spent long hours in the study of pending legisation. I followed some of these men blindly because I knew that they had investigated the measures and proved their worth. I cannot follow them to-day because I know that they have not studied, not even read, these bills. They are men led to-day, not leaders of men, as before. There is something wrong. This lightning-like legislation is without precedent and wholly without defence. In sheer desperation one member asked for twenty-four hours' delay so that he could at least read the bills, and you cried him down. A reputable and competent man offers three-cent fares and rapid transit, and you bid him begone. You are asked to demand three-cent fares on these roads and you vote for five. What chance has anybody against an organization like this? We vote away franchises worth uncounted millions without an instant's deliberation, and then complain because some people venture to be suspicious. Bills like these are not 'ripped' through Councils on their merits alone in this record-breaking fashion. There is more behind them than mere sentiment."

This wanton outrage upon the people's rights is the worst in the history of municipalities. But the worst feature about the whole Philadelphia situation is the abject submission with which almost the entire citizenship bows to the will of the machine. It seems strange that a city which boasts of its character, culture and refinement as Philadelphia; a city which ridicules other municipalities like Chicago and St. Louis, should become so boss-ridden.

What will Philadelphia do about it?

WANTED: GREATER MUNICIPAL INTELLIGENCE.

NEXT to the elimination of partisan politics from municipal affairs is needed the dissemination of practical experience and information among city officials. There are three methods, all of which are more or less employed by the progressive city official in increasing his knowledge of municipal affairs. First, by travel and investigation; Second, by attending municipal conventions; Third, by extensive reading of book and periodical literature treating upon the subject.

The first is the most expensive, but if conscientiously performed is the most fruitful of good results. There are only a few of the larger cities which are public spirited enough to afford such a tour of inspection. English, French, German and other European cities have thought nothing of sending one or more gentlemen to investigate along certain lines in American cities. It is only a short time ago since a delegation of two gentlemen from the far off island of New Zealand visited this, among other countries, in order that municipal conditions might be studied on the ground. Seattle, Washington, sent a delegation of three gentlemen upon such a tour of inspection, which included the principal cities of the East and Middle West, last year and greatly profited thereby. This is a practice which should be more frequent.

The municipal convention—national, state and local—is another fruitful source of information which should always be utilized by the modern city official. It goes without saying that the city should bear the expense of all these methods of increasing the usefulness of the official. Such gatherings as that of the League of American Municipalities, which meets in Jamestown, N. Y., next month; the convention of the American Society of Municipal Improvements, to be held at Niagara Falls next October, and all similar meetings should have representatives from every city in the land. Unfortunately, the minority element, which is found in every collection of individuals, has brought reproach upon the good names of these organizations as well as their real usefulness into question, by embracing the opportunity for "junketing" purposes only. But, in preparing to send delegates to these conventions, a better choice should be made of representatives and, at the same time, it should be borne in mind that the junket element

is largely in the minority. Information can be obtained by attending these conventions that it is impossible to find in books or on a tour of inspection. There are, many times, little items of information which a San Francisco man will give to a Buffaloian which, put in practice, will save the city thousands of dollars in the course of a year. There is no reason why any delegation should not gain enough of valuable information to more than repay the city for the expense involved for the trip to the convention. The problems confronting the city are so varied and important that too much trouble and expense can hardly be created in the endeavor to throw a stronger light upon the vexing questions. For this reason every municipality, large and small, should make a strenuous effort to be represented by one or more delegates at the next convention of the League of American Municipalities. If you have not already received the particulars concerning the convention, communicate immediately with Secretary John MacVicar, Des Moines, Ia., who will supply you with all needed information.

As regards the third source of information, its importance is so thoroughly recognized by the intelligent and wide awake city official, that it is only necessary to add: Every city in the United States should have its own municipal library located somewhere in the city hall, or where it could be the most easily referred to by the greatest number of city officials. More than this, the head of every department in civic administration should be a subscriber to and regular reader of the MUNICIPAL JOURNAL AND ENGINEER. It is a mine of information which thousands of readers have already found invaluable.

THE RIGHT WAY TO REFORM A CITY.

MUNICIPAL misgovernment is the rule in practically all large American cities. A common belief prevails that the main causes of this condition are political and social; that the bad government of cities is due almost wholly to the election of inefficient and corrupt office-holders by ignorant and partisan voters. The cure, therefore, is sought mainly along political and social lines; that is, through the political education of the masses and reform at the polls. The net result is an occasional and temporary improvement in the quality of office-holders, a partial and brief substitution of upright and zealous incumbents in place of the inefficient and corrupt.

Reforms along these lines are not lasting, for the reason that they proceed from a misconception of the true causes of the evil aimed at. These causes are only partly political and social. The chief source of bad city government is bad business methods of administration. So long as a city's business methods are bad, the city government cannot be well administered, no matter how earnest, honest and capable the public servants may be. "To turn the rascals out" and replace them by honest and capable men is a good thing to do, but even good men can better results only to a moderate degree, so long as they are compelled to work with machinery not suited for the conduct of business affairs.

Municipal government is mainly a business matter, and the rules which apply to the successful conduct of ordinary business apply with still greater force to the conduct of public business, because of the greater scope and variety of the latter.

It is well within bounds to say that no important city in America has a business system suitable for sound and economical business management. That is especially true of the city of New York. The system which has petrified about this city's business methods is such that thoroughly sound administration is imposible until a radical reform in the system shall have been made. It affords countless opportunities to corrupt office-holders and permits unchecked waste by inefficient office-holders. It creates thousands of useless places for political parasites, and paralyzes the efforts of capable and honest men in the department who deplore the waste of public moneys, who would gladly see it stopped, but who are utterly helpless to prevent that waste.

A political change can do something to better the conditions, but no matter who the men may be who are put in office, they cannot prevail against the system. It is the system, therefore, that needs reforming. It is obvious that unless the waste can be clearly shown it cannot be prevented. It is now impracticable for taxpayers to make any effective resistance to the imposts made upon them, under form of law, for the reason that they cannot prove the waste; and without such proof, they cannot hold their officials to account. Their helplessness is solely because they have no means of scrutinizing the business affairs of the city.

The municipal accounts and the public reports of the city of New York do not give taxpayers reasonable light upon the public business. They do not exhibit the public outlays in such form as to show their exact nature. They do not justify those outlays by showing that they were needful or expedient. They do not show that they were efficiently or honestly administered by exhibiting their exact results, and the true value of those results.

This city now expends annually about $110,000,000 for current expenses and the construction of new public works, and about $40,000,000 to pay debts incurred to build public works in past years. Part of this outlay (that for new construction) is provided for by new loans. The remainder, approximately $115,000,000, is a present burden upon the people. It is derived from taxation, licenses and the income from various public properties.

It is impossible to learn from the existing public records whether this vast outlay is excessive in amount or is required by the public needs. An army of approximately 40,000 employees is supported by it. These employees are very obscurely classified, so that the exact functions and utility of a large number of them are not shown.

This condition is the result of the defective system of accounting which prevails in the various departments. There is no proper coordination in the public accounts. Therefore there is no effective system of audit, except in so far as relates to the legality of the expenditures. The outlays are not segregated into the elements of cost, as in the case of outlays for ordinary business purposes. No effective comparison of values and of outlays for like purposes is provided for by the city's bookkeeping. No effective exhibits are made by the public reports of the utility of those outlays. Until these essentials are embodied in a new system of public accounts and reports, very little can be done to prevent waste, no matter how well disposed department heads may be toward that end. There are numberless impediments both in the law and the routine that prevail. It is extremely difficult and probably impossible for such a radical reform to originate in official circles, for the reason that its progress would be impeded and opposed by numberless official influences having legal power to so impede.

The source of a sound reform must be in public sentiment; not merely the sentiment of political writers, but the well-informed sentiment of protesting taxpayers, organized to make their protest effective and to impose upon their publicservants a system which their experience as business men has taught them is necessary to sound administration.

The Merchants' Association has taken the first step in such a programme of reform. Incident to its study of city affairs, imposed upon it by its resistance to the great Ramapo steal, the deplorable defects of the city's business methods were made clear to it. Some defects and the results showing the heavy loss imposed upon taxpayers by the defective system was collated by the Merchants' Association and presented to the Chamber of Commerce for its consideration, with the request that the Chamber of Commerce, the most influential body of its kind in this country, co-operate with the younger organization to bring about a radical reform in the city's system of accounts and public reports. The project was carefully considered by men eminent in this community for their breadth of view and sagacity, and has been approved by them in the strongest terms.

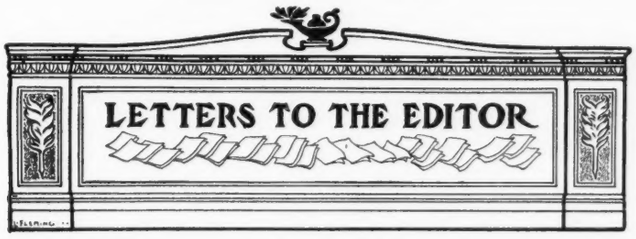
Comptroller Coler, already having a fine record for his work in the cause of reform, likewise approved the project and stated to a committee that, in his opinion, the plan as perfected would save the city millions of dollars annually.

A strong committee representing the two organizations named has been formed to perfect measures for this important public work, and it is likely that it will soon be entered upon, with every prospect of a useful and far-reaching benefit to the taxpayers, by systematizing the city's business affairs and substituting à thorough analytical system for the present loose methods.

This movement is due primarily to the public spirit of Mr. William F. King, for four years president of the Merchants' Association,

whose keen perception and unbounded energy have been directed to useful public works of this kind, especially towards those which would tend to reduce the heavy and useless burden of taxation under which the commercial interests of this city are now suffering. This gentleman's initiative has pointed the way to that kind of public organization which produces useful and lasting results, and to him more than to any other man is due the credit for pointing out the true pathway which may profitably be taken by the business men in politics. That term hitherto has meant little or nothing. It now promises that the most important interests of the community will learn the way to effectively relieve themselves from a wrongful and needless public burden, hitherto imposed upon them because they had abandoned the conduct of the public business to those less able and willing to manage it well and honestly.

FREDERICK B. DE BERARD.



"INVALUABLE SERVICE ON PUBLIC MATTERS."

CLEVELAND, O., June 12, 1901.

Editor MUNICIPAL JOURNAL AND ENGINEER:

I beg to acknowledge your favor of the 11th inst. relative to my inquiry regarding gas plants and municipal lighting. I want to thank you for the information which you so generously furnished.

I find the MUNICIPAL JOURNAL AND ENGINEER of invaluable service on public matters. It is a clearing house of information along municipal lines, which inspires confidence by reason of its candor, sincerity and judicial attitude upon public matters.

FREDERIC C. HOWE.

NON-PARTISAN CITY ELECTIONS.

FARGO, N. D., June 19, 1901.

Editor MUNICIPAL JOURNAL AND ENGINEER:

In your last issue, Mr. Clinton Rogers Woodruff mentioned in his article on "A Year's Municipal Activities," several cities which had either gone Democratic where the city was naturally Republican, and in other cases where the city which was naturally Democratic going Republican.

That is one of the best signs for the betterment of municipal government. The sooner politics are divorced from municipal affairs, so much sooner will the time come when the ordinary citizen will begin to take an interest in the city government. Here, at the last two city elections, we have not had a caucus or convention held for the nomination of city officers. In April, 1900, we elected a mayor, six aldermen, treasurer, police magistrate and justice, without the aid of a caucus or convention by any political party. This year we elected six aldermen without caucuses or conventions. While I cannot guarantee the future, it is my opinion that next spring, when we come to elect a mayor again and other city officials, the aid of "King Caucus" will not be invoked.

J. A. JOHNSON.

ANOTHER DEVICE TO KEEP BACK THE CROWDS.

WASHINGTON, D. C., June 20, 1901.

Editor MUNICIPAL JOURNAL AND ENGINEER:

In your June issue you describe San Francisco's method for keeping back crowds as the first one of its kind. We used a similar device here for the first time during the inaugural ceremonies incident to President Cleveland's induction into office for the second time, March 4, 1898, more than eight years ago. As you will note from this, Washington should have the credit for originating this method.

Our method is quite similar to that of San Francisco. The sockets sunk in the concrete, or asphaltum paving, near the curbing, into which the iron posts are inserted, are permanent in character and can be utilized at very short notice. These iron posts are set in the sockets and to maintain stability the socket is filled with oakum. The sockets are placed twenty feet apart. During times when these sockets are not used they are covered with a metal cap.

Upon any occasion when it is desired to "rope off" Pennsylvania avenue and several side streets, used to mobilize parading hosts, very little time is required in setting up the sustaining posts and stringing the steel cable. The cable is one-quarter inch in size and the metal posts practically imperishable, the several miles of the former having seen service during at least three inaugural parades and at other times when celebrations here were of sufficient magnitude to warrant the roping off of the "avenue."

The original cost of the iron posts, cable, sockets, etc., and the labor, was $2,500. Once down there is practically no expense, save labor, to set the posts and string the cable. The sockets are set only along Pennsylvania avenue from a point east of the Capitol building to Washington Circle, a point a dozen blocks west of the White House, the time honored route of inaugural parades, and practically all other shows traversing the streets of the Capital City.

RICHARD SYLVESTER, Superintendent of Police.

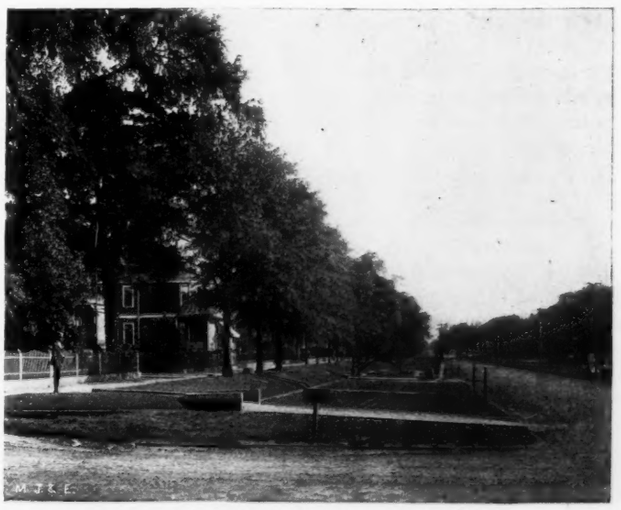
BENEFITS OF EXTENDED SIDEWALKS.

COLUMBUS, Ga., June 21, 1901.

Editor MUNICIPAL JOURNAL AND ENGINEER:

The city of Columbus was prompted to adopt the extended sidewalk on certain streets and avenues for three reasons: First, as being the most satisfactory means of obtaining a gentle slope from the property line to the street grade on such streets as have an established grade, either considerably higher or lower than the abutting property; Second, as furnishing a pleasant variation from the monotony of central parks; Third, as reducing the amount of street surface to be maintained and paved.

A portion of Second avenue, which is now being improved on this plan, is one of the important residence avenues of the city. The abutting property on the east is several feet above, and on the west several feet below the street grade. Until the extended sidewalk plan was adopted the sidewalk on the east was held in position by an unsightly perpendicular retaining wall three or four feet high, and the entire surface drainage from the street found its way to the gutter on the west. This avenue has a total width between property lines of 132 feet, and, as now improved, shows a neatly crowned driveway of thirty-six feet in the center, bordered on either side by thirty-six feet of graceful slope turfed with Bermuda grass extending to the part of the sidewalk used by pedestrians, and leaving twelve feet next



VIEW OF EXTENDED SIDEWALK IN COLUMBUS.

to the property line on either side to be paved or graveled by the owner of the abutting property.

The advantages claimed from this method of treating the avenue may be enumerated as follows:

1. A graceful slope replaces the perpendicular retaining wall.

2. A reduction of 50 per cent. in the driveway surface to be sprinkled, maintained and paved.

3. The removal of dust and noise of the driveway 32 feet from the property lines.

4. As compared with a center park a saving of 50 per cent. in curbing.

5. A pleasing lawn effect when viewed from the front windows or porches at the residence.

L. H. CHAPPELL, *Mayor.*

SUGGESTS VACANT LOTS FOR PLAYGROUNDS.

BROOKLYN, N. Y., June 27, 1901.

Editor of MUNICIPAL JOURNAL AND ENGINEER:

THE number of vacant lots that are idle about the city has often given rise to the question whether they could not be put to better use than as receptacles for rubbish. That in some localities a profitable use is made of them, would tend to show that they can be employed to advantage by their owners until it seems best to build.

In certain portions of the Borough of Brooklyn vacant ground has been let at a small rental to enterprising men who have turned the former abode of old cans, papers and weeds into veritable gardens, whereon is raised a great variety of garden truck, not only for the tenants' own use, but also for market.

In other localities, the stones and rubbish have been removed, and the ground given over to the children for play. This in itself is no mean idea. Our parks are not numerous, although beautiful, but it is this latter quality that often renders them unfit for one of the uses for which they were, or should have been, intended. Where can the children play their games when they are confronted on all sides by signs of "Keep off the grass." They may use the walks, but so may they the streets to the annoyance of pedestrians and those who, having "put away childish things," are content to obey the signs. It is not denied that, were the children allowed to run at will over the green, the grass would soon disappear, for children, like young savages, are distinctly not respecters of any one or any thing. For this very reason the vacant lots should be thrown open to them in which to romp and play, unrestrained by the warning, "Cheese it, de cop." There there would be no grass to destroy and no "grown-ups" to annoy, and they could play their baseball with no danger of broken windows.

It is the cooping them up in the streets, where there is no room to do anything, that leads boys into mischief. Their young spirits must find an outlet, and, if the energy be not spent in physical exercise, it is bound to find expression in some deviltry, to the annoyance of the neighbors and profit to the glassman. It is amusing to hear the oft-repeated admonition to a child to go into the front yard and "play quietly." As if any young animal, full of pent-up energy, could give it expression in quiet play that is but mental action! Their brains will have enough exercise before they are through with this life. It is their bodies that must be allowed to grow freely, that their nerves may be strong and their brains healthy. "A sound mind in a sound body" is the proverb, and sound must be the body before the mind can be strong. True, our schools have their "gyms" where exercise is required, but one hour of unrestrained play outdoors is worth two in the best "gym" in the world.

Let the city secure the use of the vacant lots from their owners. If presented in the proper way there can be no doubt but that the owners would be perfectly willing to *give* the use of their property, especially if there be no "appropriation" for rental to be distributed. The necessary cleaning out of the rubbish would be a matter of small expense when viewed from the point of the good to be accomplished. And then our city boys will have some of the benefits their country cousins enjoy. The "two weeks in the country" which our "fresh air" societies have endeavored to give the boys in the cities, and which, at the most, is but a drop in the bucket of health, will be greatly augmented and rendered less needed by the all-year-round play-grounds in the vacant lots.

AN OBSERVER.

It is to be hoped that "An Observer" will go one step further and open the way for a movement which will culminate in the opening of the vacant city lots in Brooklyn by the authorities of the city for the free use of the boys and girls. Mayor Perry, of Grand Rapids, Michigan, has recommended to the Council of his city that it authorize the payment of the taxes on such vacant lots by the city in order that they may be used by the children as playgrounds. What is to hinder Brooklyn and other cities doing likewise? It would be well to give the boys and girls a chance to clean the lots for their own use. They would, no doubt, be glad of the opportunity to do the greater part of the work incident thereto.—[The Editor.

—Douglas, Wyo., has William Mathew as engineer.

—Cranston, R. I., has elected Joseph A. Latham engineer.

—H. Y. Scovill was recently elected city clerk at Rockford, Ill.

—The new City Engineer of Eau Claire, Wis., is Mr. McClellan Dodge.

—The City Engineer of Massillon, O., Mr. D. C. Borton, has resigned.

—Salina, Kan., has a new city engineer in the person of Mr. George A. Perrill.

—The new superintendent of public works at Ottawa, Canada, is J. R. Ray, C. E.

—The assistant engineer of the Pittsburg Public Works, Henry B. Rust, has resigned.

—Mr. Searles has given the town of Methuen, Mass., $15,000 for sewer construction.

—Chester A. Boyce succeeds W. H. Tuttle as water commissioner at Canandaigua, N. Y.

—Mr. Andrew Fulton is the new superintendent of highways and sewers in Pittsburg, Pa.

—Louis C. Kelsey succeeds his brother, F. C. Kelsey, as City Engineer of Salt Lake City, Utah.

—Hartford, Conn., has a new assistant superintendent of streets in the person of John F. Butler.

—The chief engineer of the Board of Public Improvements at Denver, Col., is Leslie M. Long.

—Theodore Miller succeeds Henry R. Cumisky as chief engineer of the water works at Kenosha, Wis.

—The City Engineer of Alexandria, Va., has resigned his place and will go to the Philippine Islands.

—Mr. William F. King has retired from the presidency of the Merchants' Association of New York.

—Lucien E. N. Thompson has resigned the position of superintendent of water works at Dunkirk, N. Y.

—James H. Fuertes, M. Am. Soc. C. E., will move from 100 William street to 120 Liberty street, New York.

—Mr. L. B. Merriam has resigned the position of City Engineer of De Kalb, Ill., and W. M. Hay is to succeed him.

—E. M. Bigelow, M. Am. Soc. C. E., was reappointed director of the Department of Public Works at Pittsburg, Pa.

—H. D. Hallett, of Aurora, Ill., has been engaged as consulting engineer for the proposed electric plant at Kendallville, Ind.

—The engineer and superintendent of the water and light plant at West Plains, Mo., are S. D. Richardson and B. B. Cassell.

—Tuscaloosa has a new engineer of paving; Mr. W. T. McCormick, formerly superintendent of water works, has been appointed.

—Dr. Alvah H. Doty, Health Officer of the Port of New York, was married on June 13 to Miss Blanche Ida Rees, formerly of Pittsburg.

—The City Engineer of Topeka, Kan., P. L. Wise, has been appointed Chief Engineer of the Shawnee, Oklahoma and Indian Territory Railway.

—The will of Mrs. Angelica Crane bequeaths $52,204.26 and many personal effects to the city of New York for the establishing of free drinking fountains.

—Mr. S. A. Ferguson, formerly Assistant City Engineer of Detroit, Mich., succeeds Robert H. McCormick, M. Am. Soc., C. E., who has resigned the position of City Engineer.

—Mayor Byrne, of Spokane, Wash., is determined that the gas company shall pay for a new franchise. He says that the time for giving away valuable privileges has passed.

—Al. Johnson is supposed to be behind the petition of "193,000 workingmen" requesting that a 3-cent fare be a requisite condition in the contract for the new tunnel to Brooklyn.

—Park Commissioner Clausen says that the chairs for rental, recently placed in the parks, are a good thing, and that, although a novelty now, will prove as much a success in New York as others in many European parks.

—Francis A. Leach, a former resident of Brooklyn, N. Y., is a rising young lawyer of Kansas City, Mo., where he is a member of the judiciary committee of the Bar Association. He is especially interested in the study of municipal conditions, legislation and laws.

—President Guggenheimer, of the New York Common Council, is very much opposed to the recent order of President Clausen of the Park Department, allowing a private concern the right to place chairs in the parks to rent. He says the parks were meant for the free use of the people, and no special privilege should be allowed to anyone in them..

HAZEN S. PINGREE.

HAZEN S. PINGREE.

THE death of Hazen S. Pingree removes from the field of public activity one of the most interesting figures in American politics. He was Mayor of Detroit, Mich., for four successive terms and was twice Governor of Michigan.

He was born at Denmark, Me., on August 30, 1849, and was the son of a farmer in not more than moderately good circumstances. He worked on his father's farm until he was fourteen years old, and then went to work in a cotton mill at Saco, Me. Later he went to Hopkinton, Mass., and started in as a shoecutter in a factory there. When the Civil War began he enlisted in the First Massachusetts Heavy Artillery. He served throughout the war with the exception of four months which he spent in the Confederate prison at Andersonville as a result of one of the raids of Mosby's guerillas. When the war was over he went to Detroit and began to peddle butter and eggs. Then he went into a shoe factory again for a short time. Later with a partner, C. H. Smith, he started a shoe factory. It was small at first, but afterward developed into one of the largest in the country.

Pingree was a millionaire when the Republican nomination for Mayor of Detroit was offered to him in 1889. The offer in itself was not very attractive, because the Democratic party in the city was strongly intrenched behind a plurality of about 3,000 votes, gained in the election of 1888. He said at first that he did not want the nomination, but at last he took it. He worked hard during the campaign and won by over 2,000 votes. He was reëlected three times and was holding his office of Mayor when he was elected Governor.

While he was at the head of affairs in Detroit Mayor Pingree was always doing something for the city's good. He began by pitching into the firms that were lighting the city. He said the city was paying too much and ought to have its own plant. He pushed his plan through. Then he went for the street railroad companies and ended by making them give three-cent fares. He made the city provide new sewers and pave its streets.

In doing all these things he made enemies, for he was more vigorous than diplomatic in his campaigns. The philanthropic scheme which gave rise to the nickname "Potato" Pingree was conceived by the Mayor before he had been long in office. It was a plan to turn over the city's unoccupied lands for the cultivation of potatoes by the poor. Notwithstanding all the fun that was poked at him he made it in some degree a success, though he had to get up a "municipal circus," with Aldermen and municipal officers dressed in grotesque costumes in a street parade, to pay off some of the debts.

In 1895 he got into a fight with the Detroit newspapers. They declined to print some of the news he was giving out, so he put up bulletin boards in front of the City Hall and published his own news. One winter he chloroformed to death his own carriage horses because, as he said, he couldn't afford to keep them supplied with food until spring. At another time he created excitement by his fight against bakers, who, he said, were charging too much for the bread which they sold to the poor. He also fought telephone companies for lower rates.

In 1896 he was elected Governor of Michigan, running ahead of McKinley by several thousand votes. He was reëlected in 1898. His power as a politician began to wane at about that time. He retired from office in January.

MUNICIPALITIES HAVE NO RIGHTS.

ACCORDING to a recent decision of the Supreme Court of Pennsylvania, municipalities are the creatures of the legislatures, and their powers are entirely in the hands of that body. They have no vested rights in their offices, charters or corporate existence. Even the right of popular election is not guaranteed them by the constitution, and the legislature can make the city offices permanently appointive if it so desires.

CONVENTION DATES.

JULY.

The American Library Association will meet in Waukesha, Wis., on July 3, 1901.

The Chiefs' of Police, Sheriffs' and Town Marshalls' State Convention will be held at Columbus, Ga., July 10. Wiley Williams, Columbus, Ga., secretary.

The State Firemen will hold their ninth Annual Convention and Tournament at Fremont, Neb., July 16-18.

The Vermont State Firemen's Association will hold its annual convention at Burlington, July 17. E. D. Moore, secretary, Bennington, Vt.

The Trans-Mississippi Congress will meet in Cripple Creek, Colo., on July 17-21.

State Firemen's Association Convention is to meet at Plymouth, Wis., July 20.

The North Carolina State Firemen's Convention will meet at Charlotte, July 23-26.

AUGUST.

Illinois Firemen's Association, Dixon, August 13-15.

The Pacific Coast Association of Fire Chiefs meets in its ninth annual convention at Tacoma, Wash., August 14-17.

New York Firemen's Association, Convention at Buffalo, August 20-23.

The National Firemen's Association meets at Buffalo, August 22-24, 1901. D. W. Gillen, 176 Monroe street, Chicago.

New York State Firemen's Convention and Firemen's week at the Pan-American Exposition, August 19-24, 1901.

State Firemen's Association, Convention, August 24-25, Atlantic City, N. J.

American Florists' and Ornamental Horticulturists' Association will meet in Buffalo, N. Y., on August 20-24, 1901. William J. Stewart, secretary, 67 Broomfield street, Boston, Mass.

League of American Municipalities will hold its annual meeting at Jamestown, N. Y., August 21-24, 1901.

"Municipal Day" will be observed at the Pan-American Exposition August 26, 1901.

The International Association of Fire Engineers meets in its twenty-ninth annual convention at Indianapolis, August 27.

SEPTEMBER.

The Glasgow Engineering Congress, Glasgow, Scotland, will be held in September, 1901.

The Municipal Electricians will hold their meeting at Niagara Falls, September 2-4.

The New Jersey State Firemen's Association convenes September 9.

New Jersey State Firemen's Association holds its annual convention at Atlantic City, N. J., September 11. H. N. Brown, secretary, 407 Planek, Newark, N. J.

American Public Health Association will meet in Buffalo, N. Y., September 17-20, 1901. Dr. C. O. Probst, secretary, Columbus, O.

The Virginia State Firemen's Association meets at Staunton, Va., September 25-26, 1901.

OCTOBER.

The International Cremation Congress meets in Buffalo, N. Y., October 1-3.

The American Society of Municipal Improvement meets at Niagara Falls, N. Y., October 1 to 4, 1901. D. L. Fulton, Allegheny, Pa , secretary.

The National Good Roads convention will be held in Buffalo in October.

Pennsylvania State Firemen's Convention and Tournament will be held at Philadelphia, October 1-4, 1901.

ODD THINGS RELATING TO MUNICIPALITIES.

A Woman Scavenger—Pious and Impious Mayors—An Embellished Alderman and Other Municipal Oddities.

A WOMAN SCAVENGER has hung out her shingle in Victoria, B. C. She advertises to remove all refuse in a sanitary and expeditious manner, at prices to please the general public. Next!

TURTLES IN CITY WATER.—Dr. John H. Noble, of Eau Claire, Wis., has a snapping turtle three inches long which he took from the stomach of one of his patients the other day. The doctor affirms that the animal must have been swallowed in the drinking water supplied by the city.

AN ODD PROPOSAL.—The authorities of Augusta, Me., have been running the following remarkable advertisement for proposed improvements on the hospital for the insane located in that city: "Sealed proposals will be received until June 11, 1901, etc., etc., for work on one of the female wings of the insane hospital!"

ELECTRIC LIGHTS ARE NOT WANTED at Bay Head, N. J., and, according to the press reports, the Mayor of that little New Jersey town, together with several Councilmen, have been making war on the company which has been running a plant for some time past. Tallow dips and kerosene are preferred, and these "new fangled" methods of lighting are rejected with scorn.

A MUNICIPAL WEDDING PRESENT of 100,000 francs is to be given to a couple of giants once a year, that is, a giant and a giantess, in order to regenerate the human species. This odd provision is the result of a bequest recently made to the city of Rouen by Count St. Ouen de Pierrecourt, amounting to 10,000,000 francs, on the condition that this gift should be made annually.

A MUNICIPAL TERRIER.—In a report to the Manchester (Eng.) Port Sanitary Authority Dr. Crocker deals with the danger of infection from rats on ships coming into the port. He suggests that all ships should be kept from four feet to six feet from the quay, and that rat guards should be placed on all hawsers communicating with the shore. He also urged that if a gangway ran between the vessel and the quay a terrier should be chained at one one end, especially at night.

MUNICIPAL BLUE LAWS OF CONNECTICUT.—The following are some of the blue laws which were once in force in Connecticut cities: "No one shall run on the Sabbath day or walk in the garden or elsewhere, except reverently to and from meeting. No one shall travel, cook victuals, make beds, sweep house, cut hair or shave on the Sabbath day. Whoever shall bring cards or dice within the city shall pay a fine of £5. No woman shall kiss her child on the Sabbath or fasting day."

MUNICIPAL CRUSADE AGAINST SUICIDE.—People have become impregnated with a mania for commiting suicide, so Mayor Morse of Emporia, Kansas, believes. He thinks its spread is due to the publication in the daily papers of the details of the event, and, for this reason he has enjoined all publishers from giving publicity to the details, under the penalty of fine or imprisonment, or both. He has appealed to the Board of Health to back him up in his endeavor to stop the spread of the "disease."

PREFERS SHIRT CUTTING TO MAYOR'S CHAIR.—The gigantic mosquitos are not the only odd things which New Jersey produces. Other localities have been running a strong competition to this long standing mark of superiority, so that there has been some danger of a loss of prestige, but Jersey proposes to maintain the record for freaks at any cost. The idea seems to have been absorbed by everybody. The latest product in this line is a Mayor who voluntarily leaves the Mayor's chair and lucrative salary for a position as a shirt cutter in New York City.

AN EMBELLISHED ALDERMAN.—A member of the New York Board of Aldermen spoke disrespectfully to Alderman Bridges, the poet rival of Bathhouse John of Chicago, the other day: "Go on," said the Alderman, jauntily; "go on; we all know your finish!" "How?" asked the Councilman. "The Legislature has embellished you; that's how." "Don't you mean abolished, Alderman?" asked the Councilman politely. "That is a better word for what the Legislature did." "I don't know what the Legislature called it," retorted the Alderman, with fine scorn, "maybe they called it abolished and maybe they didn't. But I said embellished, and that's what I meant."

PIOUS AND IMPIOUS MAYORS may be found in Garnett, Kansas, and Zanesville, if newspapers are to be believed. It is reported that the Kansas Mayor, after being sworn into office, opened his first council meeting with prayer. Later he issued a manifesto which starts out: "Fear God and keep His commandments and keep the Sabbath Day holy." The manifesto further declares that cigarette smokers will be prosecuted, the curfew law strictly enforced and that drunkenness, whether on the streets or in private houses, shall be dealt with stringently. The Mayor of Zanesville, Ohio, however, goes to the other extreme and openly asserts his belief that saloons should be run on all days of the week and at all hours of the day and, further, that gambling of all kinds as well as houses of ill-fame should be licensed.

A CIVIC PLURALIST.—The Mayor of Vineland, N. J., found the salary of his office inadequate to keep up the dignity of the position. The salary was sixty dollars a year. On his making proper representations to the council it was decided not to increase His Honor's salary as Mayor, but to appoint him to the more lucrative position of janitor of the city hall, the wages of the janitorship being twenty-five dollars a month. Now, however, a point of law is raised that he cannot legally occupy the two positions, and what is perhaps more serious, the Women's Golf Club, which had elected the Mayor an honorary member, refuses to receive the janitor in that capacity. It is not right to expect the ladies to play golf with a man who foozles with a coal shovel. We fear the Mayor-Janitor must choose between wealth and honors.

A JUVENILE ELECTRIC LIGHT PLANT.—One of the most remarkable electric lighting plants in the State of Missouri, and probably in all the United States, is that of the American Electric Power Company. The plant is situated in the back yard of Mr. Edward Field Goltra, who resides in St. Louis, the proprietor being E. F. Goltra, Jr., who is president of the company, all the members of which are his friends and playmates, not one being over 10 years of age. Some time ago the boys started to study electrical engineering and were permitted to experiment. A little later the house was connected for electric lighting by one of the large local lighting companies, when the boys stepped in and by exercising their "pull" managed to get the contract away from the corporation, securing it for themselevs. It is said that the service rendered by the boys' plant is satisfactory, and that the experiment so far has been a success.

SHIRT WAISTS IN A HIGH SCHOOL.—The shirt waist question is causing trouble in the high school of Binghamton, N. Y., a number of the women teachers having refused to officiate where male pupils come into the class so attired. They allege that it is unbecoming, lowers the social standing of the school and gives a tendency to negligence and laxity not only in study, but discipline. The young men contend that it is purely a matter of comfort, that they can study better in shirt waists than in the regulation coat and vest on a hot day, and declare that they will never give up their rights. The subject was brought to the attention of Prof. Banta by several of the women teachers, and he replied that the principal of each department would have to settle the question in his or her department, but he refused to allow the students in his classes to appear in shirt waists. Bruce Crisman, one of the students, has decided to make a test case and will carry the question to the Board of Education for a decision.

CURRENT NEWS AND PRACTICE AMONG THE CITIES.

Anti-Weed and Noise Ordinances—Small Hose Used to Clean Streets—Belgium Produces Light from Smoke—Useful Information Boiled Down for the Busy Man.

A NEW CITY HALL is to be built in Colorado Springs, Col., at an expense of $118,000. Bonds have been issued for that amount, and the project will soon be under way.

THE COST OF ASPHALT MAINTENANCE, covering a period of seventeen years in most instances, in Omaha, Neb., has been shown to range from 4 to 7 cents per square yard.

WOMEN BARKEEPERS are not allowed in the city of Phœnix, Ariz. An ordinance has been passed prohibiting the employment of females in places where intoxicating liquors are vended or given away, and also prohibiting the presence of women in saloons.

USE SMALL HOSE TO CLEAN STREETS.—Superintendent Hillery, of the Buffalo Street Cleaning Department has been experimenting with small hose for cleaning certain streets by flushing. He reports that it gives much better results than large hose and is not so expensive.

BOSTON'S ELEVATED RAILROAD was opened to the public on June 10th, when nearly half of the population stopped work long enough to take a ride on it. The "Baked Bean City" is not accustomed to novelties and when one is introduced into the municipal life nearly the whole population goes crazy over the event for a short time.

CHICAGO GETS STEAM FROM GARBAGE is the report which is given out by the press. The plant is a comparatively small one and is an experiment. By the burning of refuse alone, without the assistance of coal, at the rate of twenty tons per day, seventy-five pounds of steam pressure has been developed and maintained.

THE WEED ORDINANCE, which has been a dead letter for a long time in the city of Dayton, is now likely to be enforced. City Solicitor Matthews has called attention to the law which requires all property owners to keep the noxious weeds, growing in front of their lots, cut down. The police department has been called into service to assist in enforcing the ordinance.

BELGIUM PRODUCES LIGHT FROM SMOKE, according to a report of Consul Mahin, of Reichenberg. He says that a Belgian engineer, by the name of Tobiansky, has discovered a method by which smoke can be turned into light. In operating his device, the inventor collects the smoke from any kind of a fire and forces it into a receiver. It is then saturated with hydrocarburet, and a brilliant light results.

OFFERS TO PAY FOR GARBAGE—According to a press dispatch J. L. Larmore of Indianapolis has offered to pay the city of Anderson, Ind., a certain sum for the privilege of collecting and disposing of the city's garbage. He expects to reap a profit from the reduction of the refuse into its constituent parts and selling the same. At present the city is paying several thousand dollars annually to dispose of its garbage.

WIRES MUST GO UNDERGROUND is the decree of the administration of St. Paul, Minn. This ordinance was passed last year, but could not be enforced because no method had been devised to obviate the necessity of overhead wire at intersecting streets for lighting purposes. The city has overcome this difficulty by the erection, at its expense, of ornamental poles with a projecting arm at the top, the wire being connected with the conduit.

BOOK SHELVES ARE OPEN TO THE PUBLIC in the Detroit libraries for the first time in the history of the management of that institution. This liberty only includes the larger per cent. of the books of fiction, for it has been found impracticable to open the other works to the inspection of the public owing to the location of the book shelves. There are about 3,000 of the best and most popular works in the English language thus placed within the reach of patrons.

A SANTIAGO LIGHTING PLANT, together with power, is one of the modern improvements soon to be made in that Cuban city. It will have a capacity of 240 arc lights and 6,000 incandescent lights. Two hundred horse-power will be furnished to small consumers in and about the city. At first the plant will be steam driven, but later on power will be transmitted from the Guaso river waterfalls, about seventy-five miles distant, where there is an available head of 600 feet, and which can develop a minimum of 1,500 horse-power in the dry season.

ITALIAN CITY CENSUS.—According to the census taken a few months ago, there are eleven cities in Italy whose population exceeds 100,000, but there is no city in the Kingdom with a million souls. The largest city is Naples, with 563,731; then follow Milan, with 491,460; Rome, 463,000; Turin, 335,639; Palermo, 310,352; Bologna, 152,000; Venice, 151,800; Messina, 149,823, and Catania with 149,694. The most populous provinces are Milan, Rome, Naples and Turin. The total population of Italy has increased during the last ten years about four million souls.

NEW ELECTRIC RAILROAD IN RUSSIA.—The first suburban electric railroad in Russia was opened for traffic this year. It connects Lodz, in Russian Poland, with the neighboring towns of Zgierz and Pabianice, and is thirteen and a half miles in length. The Thomson-Houston motors were used. It was built by a company of Polish merchants and manufacturers at a cost of $60,000. The charter provides that the government shall receive a share of the profits, and shall have the right to purchase after twenty years, and that the road and all equipment shall become the property of the government at the expiration of twenty-eight years.

AN ANTI-NOISE MOVEMENT has finally struck New York city. It is largely aimed at the hawkers who wander about the streets from daylight till long after dark, in some instances, crying their wares or wants. It is proposed to restrict this sort of street traffic to the hours between 9 a. m. and 5 p. m. These are a few of the cries to be prohibited: Old chairs to mend! Old chairs to mend! Rush or cane bottoms, old chairs to mend! New mackerel! New mackerel! Any old rags? Any old rags? Horse radeesh! Fresh horse radeesh! Wuxtra! Terrible murder in Patagonia! Raspberries! Strorberres! Yahoo—oo! Knives to grind? Scissors to grind? I pay cash clo! I pay cash clo! Mee-yaw-ough-whee-ee-ee-lik! Milk!

NO MUNICIPAL RULE IN BARBADOS.—Consul S. A. Macallister, of Barbadoes, W. I., informs THE MUNICIPAL JOURNAL that there is no municipal government on the island. It is divided into twelve Parishes, and the taxing and collection of taxes and enforcement of law relative to each are executed by the several parochial officers. The general laws governing these parishes are enacted by the legislative authorities, which consist of a Governor, a legislative council of nine members nominated by the Sovereign, and a House of Assembly composed of two members for each parish, and two members for Bridgetown, all being elected by qualified voters. Bridgetown is the largest town in the island. None of the towns are incorporated.

NO LOOSE PAPER, in the future, is to be thrown on the streets of Moline, Ill., for Chief of Police Kittilsen has declared war against all offenders. Besides this, store sweepings are not to be swept on to the sidewalk; nor ice washed on the streets; nor water from the scrubbing of saloons or stores to be swept across the sidewalk; nor garbage or offensive matter to be placed on the streets; nor kitchen refuse to be placed elsewhere than in galvanized iron cans holding between three and ten gallons, under a penalty of from $3 to $100. Mayor Barr, of Joliet, Ill., has instituted a similar campaign in his city. President Grove, of the Cleaner Dallas League, of Dallas, Texas, has warned the inhabitants of his town that the ordinances covering the same items as mentioned above will be strictly enforced.

GREAT REDUCTION IN COST OF REMOVING EARTH.

New Method Doubles Man's Capacity—Discharged if He Works Too Hard—More Fatiguing to Drivers and Horses Than to Shovelers—To Go Faster or Slower Than Schedule Time Defeats the Purpose.

By G. A. Parker.*

In most construction work the cost of common labor is one of considerable proportions, but I shall consider now only so much of that labor as relates to loading and unloading carts and carting.

NEW SYSTEM SECURES ASTONISHING RESULTS.

Under the usual methods it has been found that eight to twelve yards per day is all that a man can load, so the statement that men at Keney Park load twenty or more yards per day would make one doubt the author's veracity, especially when it is added that the men do not get as tired loading the twenty yards as in loading the twelve by the old method. Yet such is the case.

Three years ago, during a sleepless night, the thought occurred to me of utilizing the time element in loading carts to the advantage of the men and the park. A few experiments convinced me that I was right.

THE METHOD ILLUSTRATED.

As an illustration, take a case where things are favorable to the method, viz., a loose bank of sand, plenty of room for teams to drive onto the bank and for the men to load on both sides and rear, and a cubic yard to a load. It takes 150 shovelfuls to make a cubic yard and, with each man putting in five shovelfuls, thirty men would seem to be needed, but, finding that one-twentieth of a man's time is not efficient, twenty men can do the work, one extra being allowed, however, for a margin.

The time for five shovelfuls is fifty seconds, but the actual time used is fifteen to thirty seconds. So the remaining twenty to thirty-five seconds is rest. This is the secret of the method. Working quickly for a few seconds, then an absolute rest. Five shovelfuls in fifty seconds seems to be the limit and can not be increased profitably. Four shovelfuls in forty seconds would be better, provided there was room to work the men.

Deducting 5 per cent. for waste time, five shovelfuls in fifty seconds means twenty-two and four-fifth yards for ten hours' work, and this can be easily accomplished.

THE REASON FOR IT.

The fact that the men are not more exhausted in doing this twenty-two yards than in loading the twelve by the old method is not entirely due to alternating rest and work. It is the spirit that aids the muscle. When alone, the man has only his own spirit, but as one of five or ten, he has also the composite spirit which comes when many are united for a common purpose. Five men will fill five carts more quickly, if loading into one cart, than if each loaded a cart by himself.

There is another element that lessens exhaustion in that it requires a greater mental activity. The laborer must count his shovelfuls, for he is liable to discharge if he puts in one too many. Competition comes in, for no one wants to put in the last shovelful. Thus he becomes interested in his work and it does not become drudgery.

TEAMS MUST MOVE ON THE SECOND.

The arrangement of teams is very simple. The carts must enter the pit exactly the length of time apart that it takes to load one. To find the number of teams needed, determine the time the cart must take for the round trip over the route, allowing twenty miles as a fair day's travel. Divide this by the loading time and the result is the number of teams needed.

The following shows how this works:

40	seconds	loading	teams,	120	feet	apart,	44	teams	per	mile
50	"	"	"	150	"	"	35	"	"	"
60	"	"	"	180	"	"	29	"	"	"
70	"	"	"	210	"	"	25	"	"	"
80	"	"	"	240	"	"	22	"	"	"
90	"	"	"	270	"	"	20	"	"	"
100	"	"	"	300	"	"	18	"	"	"
110	"	"	"	330	"	"	16	"	"	"
120	"	"	"	360	"	"	15	"	"	"
150	"	"	"	450	"	"	12	"	"	"
180	"	"	"	540	"	"	10	"	"	"
210	"	"	"	630	"	"	8	"	"	"
240	"	"	"	720	"	"	7	"	"	"
300	"	"	"	900	"	"	6	"	"	"
600	"	"	"	1,800	"	"	3	"	"	"

The following table shows the number of seconds' loading time, the number of loads carted per day, number of loaders needed, and the number of cubic yards loaded by each loader, and the cost per cubic yard to load:

40	seconds	loading	900	yds.,	40	loaders,	22½	yds.	each, 6 2-3
50	"	"	720	"	32	"	22½	"	" 6 2-3
60	"	"	600	"	29	"	21	"	" 7 1-4
70	"	"	514	"	26	"	20	"	" 7 6-10
80	"	"	450	"	23	"	20	"	" 7 7-10
90	"	"	400	"	20	"	20	"	" 7 1-2
100	"	"	360	"	19	"	19	"	" 7 9-10
110	"	"	327	"	18	"	18	"	" 8 3-10
120	"	"	300	"	17	"	17	"	" 8 1-2
150	"	"	240	"	16	"	16	"	" 10
180	"	"	200	"	13	"	15	"	" 10
210	"	"	171	"	12	"	14	"	" 10 1-2
240	"	"	150	"	11	"	14	"	" 11
300	"	"	120	"	9	"	14	"	" 11 1-10
600	"	"	60	"	5	"	12	"	" 12 1-2

These tables show that by taking into consideration other elements than muscle, inherent in every workman, his work is increased ten yards per day and the cost reduced from twelve and one-half cents per yard to six and two-third cents.

GREATEST GAIN IN LOADING IN A MINUTE.

The greatest gain comes with the loading time not over one minute nor less than forty seconds. If over two minutes, the cost of carting increases, for the pay is just as much when the team stands in the pit as when walking. It is a slow team that walks only 200 feet per minute and most go 210 feet. So, allowing a team but twenty miles a day, or 176 feet per minute, each team has two or three minutes rest before entering the pit, and this is needed by the horses. After entering the pit there is practically no stopping until the pit is reached again.

Much to my surprise, it was the teams and drivers that had the hardest time; the shovelers the easiest.

The cost of the teams standing in the pit by the old method is a large item in the expense. If the haul is 1,000 feet and five minutes is spent in loading, the cost of the teams standing in the pit is as great as the cost of cartage. With five men loading, taking ten minutes, it costs twelve and one-half cents for the loading and five cents for the horses standing still, or seventeen and one-half cents in all,—the cost of the horses standing in the pit should be added to the loading and not to the carting.

With five men loading and 1,000 feet haul, the team works just one-half the time. If ten teams are at work at a cost of $45 per day and the haul is 1,000 feet with five men loading, by the Keney Park method, the same amount of carting can be done with half the teams or twice the amount of carting with the same teams and not overwork the horses. Fifteen dollars per day could thus be saved. The Keney Park method reduces the cost of carting to its lowest time element.

EVERY MOVEMENT MADE ON THE SECOND.

The method is this: A schedule of running time is known and the teams numbered. A timekeeper at the entrance of the pit takes the team's number and the hour, minute and second it passes and, if fifty seconds be the running time, allows another team in when that time passes and so on through the day.

Fifteen men are all that can load into a cart at one time, so the loaders form crews of fifteen each and the cart stays twenty-five sec-

* Superintendent of Keney Park, Hartford, Conn.

onds with each crew until it is loaded, when it passes out of the pit. It takes about a minute in going through the pit and one and one-half minutes at the dump.

A two or four-horse plough is used to keep the material loose, picks being used in corners only.

Such is the outcome of this method and it is practicable in more places than might at first appear. If the time in loading be fifty seconds, then 720 loads form a day's work. It is practicable to run on forty seconds' time, so 180 loads can be added to this.

TO HURRY IS FATAL TO PLAN.

With many teams waiting at the start in the morning it is tempting to start them in as fast as possible, but this is fatal to the purpose. It were better to increase the time at the start than lessen it, for if the men be crowded at the start, they will not recover during the day.

A practical illustration of how this method saves time and money was shown when 1,100 yards of material was carted away, two large trees cut, several stumps removed and the whole ground smoothed at a cost of $122 and two and a half days of time spent in the work. The entire work, therefore, including cost for trees and stumps, was a trifle over ten cents per yard. Could this have been done by the old method at any such price?

WHAT THE WOMEN ARE DOING FOR CIVIC CLEANLINESS.

BY MRS. C. G. WAGNER.*

BECAUSE of the indifference on the part of many of our voters, combined with the exactions of business for others, and the neglect of our city officials in matters pertaining to the betterment of the city, it was forced upon the minds of a number of thinking women that something ought to be done to remedy the existing evils. For this reason, in April, 1890, the Women's Health Protective Association of Brooklyn, N. Y., was incorporated.

Its attention was first drawn to the unsanitary methods of collection and disposal of garbage and ashes. At that time the garbage was carried beyond the harbor and dumped into the sea, only to be washed back again upon the south shore, leaving an unsightly and ill-smelling beach. It was frequently placed upon the walk in paper boxes, grape boxes, and even newspapers have been used for the unfortunate collector to handle, but by constant agitation, to some extent that has been corrected; for, at present, in most localities the receptacles are more in accordance with the city ordinance: "That it should be put in unleakable vessels." The larger portion of the garbage is now cremated, and the association looks forward to the day when it shall all be disposed of in that way.

Another line of work was that of getting the householder to keep the ash cans within the fence line, and when it is complied with, is certainly an improvement on the old way of having a long row of unsightly barrels and boxes lining the edge of the walks, filled to overflowing with worn-out pots and kettles, old brooms, rubbers, umbrellas, and various articles of household waste too numerous to mention.

And now the association has secured the separate removal of rubbish, although not done to its satisfaction, yet hoping some day to reach the point it aims for.

Expectoration in public places had become a filthy nuisance, sickening and unsightly to the eye and detrimental to health, so the association started a crusade against that. By constant visiting of the officials, the Health Board and the railroad officers it secured the placing of "anti-spitting" placards in most of the cars and public buildings, but little good could be accomplished without a penalty. Now, after six years or more of persistent effort and appeal to those in authority, it has succeeded in getting a penalty attached to the ordinance against expectoration in public places, though the fine is greater than the association would ask. There is an improvement, and many of its friends express grateful thanks for the change that has been wrought, though it never will be perfect until one part of our great metropolis can be taught to respect the rights of the other part.

The agitation against the slovenly manner in which the street cleaning was done brought about a better state of affairs, thanks to Col. Waring, for surely the present system far exceeds the old, when the dirt was swept into heaps and left sometimes for days before its gathering, for the winds and wagons to scatter it again. Though fallen below Col. Waring's standard, still it is in great advance of the past.

The unsanitary plumbing in some of the public schools was brought to the notice of the association as being detrimental both to the morals and the health of the pupils. On investigating, a sad state was found in some of them and continues the same to-day. Lack of funds was the excuse given for the condition of the buildings, though languages and the higher branches could be taught at a great expense to the taxpayers. Very little has been done, and the association intends to continue its efforts until these things are remedied.

Among the minor reforms of the association was getting the piggeries removed beyond the city line. The placing of cans on the street corners for waste paper is another reform, and the overflowing condition of some show how useful they are and how much would otherwise be distributed in the streets. An uncleanly obstruction on the edge of the walk was the grocers' coal boxes; they are now placed against the house. To a great extent the association has succeeded in having carts that were left standing in the streets stabled elsewhere. The distribution of circulars on the streets has claimed its attention for years, but success in that direction has not come yet.

"The secret of success is constancy of purpose."

* Treasurer of the Women's Health Protective Association of Brooklyn, N. Y.

PUBLIC LIGHTING OF BERLIN.

BERLIN is one of the best lighted cities in the world, and this result is secured by the use of 27,900 incandescent gas lamps, placed in 22,863 lanterns, 322 arc lamps, 112 incandescent electric lamps and 922 petroleum lamps.

All the gas lights are incandescent of the Welsbach type, and 15,673 lanterns have one burner, 5,666 have two burners, 285 three burners, and eight have five burners. The burners, which burn all night and every night, use on an average 5.9 mantles and 1.8 chimneys per year; those lanterns which burn every night until midnight use on an average 5.5 mantles and 1.5 chimneys per year. All gas lamps are fixed at a uniform height of twelve feet, but vary in their distance from one another in different parts of the city.

The average distance between the lamps is 86 feet, but varies from 43 feet in the centre of the city to 116 feet in the outer districts.

The lamplighters have on the average sixty lanterns to clean and light and take care of, and the fitters who replace the mantles and chimneys, clean the chimneys and burners and regulate the lamps are provided with a helper, and each is given the care of 1,400 lanterns.

THE EVOLUTION OF THE NEW YORK POLICE DEPARTMENT.

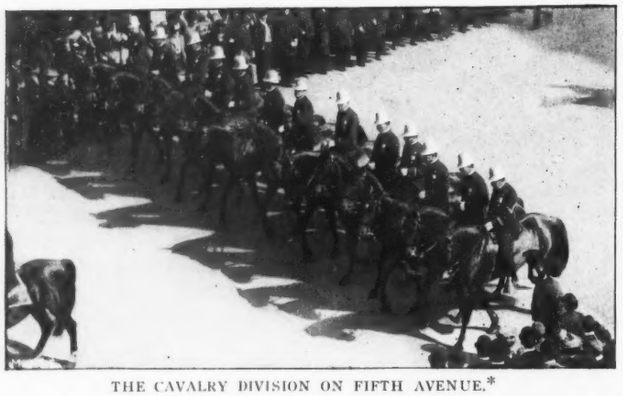
"The Finest" on Parade—Burgher Guard Created in 1643—Peter Stuyvesant First Chief of Police—Origin of Word "Cop"—Once Called "Old Leatherheads."

THE Police Force of New York City appears to the best advantage on annual parade day. It is only then that a correct idea of the magnitude of the department can be realized. The marshalling of the forces of this imposing body of men cannot fail to have its influence upon the general public, both as an inspiration of confidence and fear, in the hearts of the law-abiding on the one hand and of the criminal classes on the other.

This year, nearly 4,000 men were in line. As platoon after platoon of immaculately uniformed officers swept by in parade, it formed an impressive and spectacular picture that will not soon be forgotten. There may be sufficient foundation for much of the fault which is found with the administration of this famous department, but when it is compared with similar forces in other cities touching its general efficiency its record shines the brightest.

OLDEST FORCE IN WESTERN HEMISPHERE.

New York City has the oldest police force in the Western Hemisphere. It has been in operation, in some form, for over two hundred and fifty years. The first force consisted of one officer, who served in 1624 when the population of the city numbered but 270 souls. The burgher guard was created in 1643, when, in comparison with the present, some rather peculiar regulations were in vogue. For instance, one rule read as follows: "If any one of the burgher guard shall take the name of God in vain, he shall forfeit for the first offense ten stivers; for the second, twenty stivers; and for the third offense, thirty stivers, which, according to the historian, is good Dutch for thirty days. Another rule reads: "Whosoever comes fuddled or intoxicated on guard shall for each offense pay twenty stivers; whosoever is absent from his watch without lawful reason shall forfeit fifty stivers."



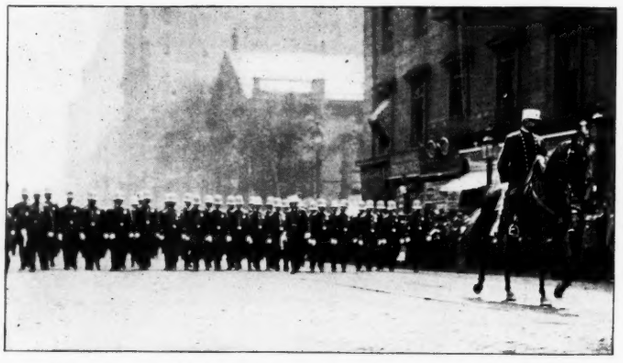
THE CAVALRY DIVISION ON FIFTH AVENUE.*

FIRST THOROUGH ORGANIZATION IN 1658.

The city is indebted to Peter Stuyvesant for the first thoroughly organized police force. The Schout Fiscal was made the head of the department, which consisted of what was called the "rattle watch," numbering eight men. These men patrolled the city by night and left it to take care of itself during the day. This was about 1658. The English continued the same system upon securing possession of New Amsterdam, and in 1674 increased the force to sixteen men, and in the following year to twenty-eight. The total cost of the department in 1684 was $750. The first uniforms were worn by four bellmen, who were appointed in 1693. At this time the Council voted that each one of the bellmen or day police should have "a coat of ye citty livery, with a badge of ye citty arms, shoes and stockings, and charge itt to ye account of ye citty."

SLOW GROWTH IN NUMBERS.

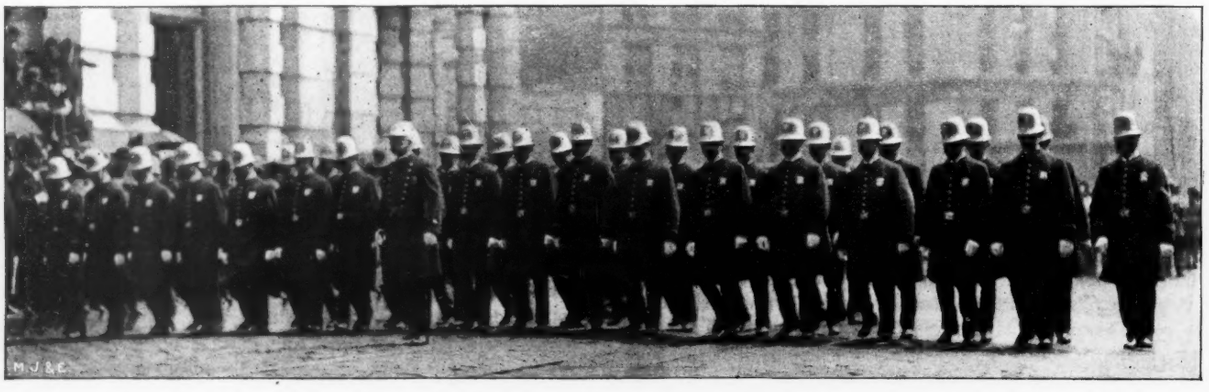
There was a gradual growth of the force in numbers and in responsibilities along through the next century. In 1800 the force consisted of two captains, two deputies and seventy-two men, with an annual cost for maintenance of $21,000. Thirty-eight years later the department was reorganized, having at that time one superintendent, twelve captains, thirty-four assistant captains, 132 sergeants and 784 watchmen. Half the men were required to be on duty each alternate night. Most of the members of the force were citizens who had other employment during the day. They wore leather helmets, similar to those of the firemen, from which they were nicknamed "Old Leatherheads." Later they wore copper shields, which is given as one source of the word "cop" as applied to policemen and abbreviated from "copper."



INSPECTOR CROSS ON THE FINEST HORSE IN THE DEPARTMENT.

For the first time in its history the New York Police Department became a creature of the State in 1844, when it was thoroughly reorganized along metropolitan lines, taking the English plan as a pattern. The old watch system was abolished and the seventeen wards of the city were divided into patrol districts, with a station house

* Reproduced by courtesy of the *Mail and Express.*

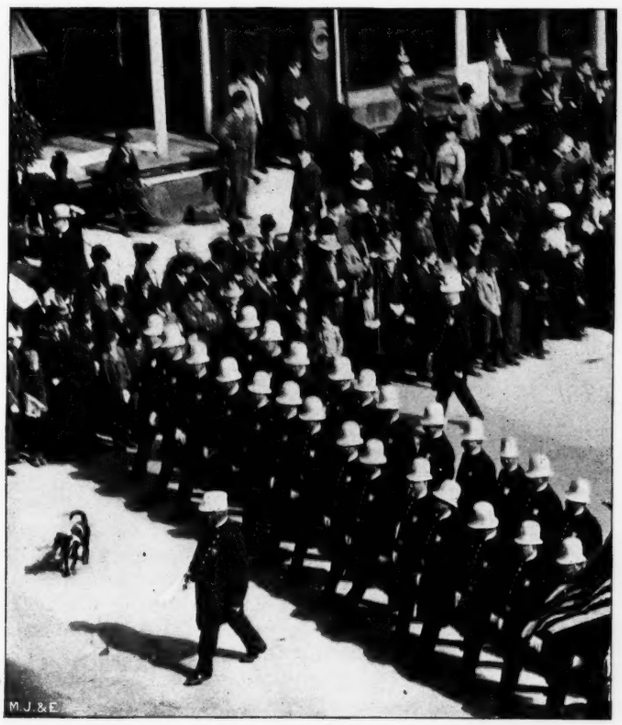


LINE OF BLUECOATS PASSING THE POSTOFFICE.

in each with a captain and sergeant in charge. The force was 900 strong at this time.

CONTRAST BETWEEN OLD AND NEW.

The consolidation of the police of New York, Westchester, Richmond and Kings counties into what was known as the Metropolitan Police occurred in 1857. This combination was under the control of a board of seven commissioners, including the Mayors of New York



SERGEANT CHURCHILL HEADING THE SQUAD OF THE WEST SIXTY-EIGHTH STREET STATION, WITH MASCOT.

and Brooklyn. This combination was abolished in 1870, with the police force of New York City governed by itself. Upon the creation of Greater New York in 1898, the police forces of the counties of New York, Kings, Queens and Richmond were again united, and placed under the control of four commissioners. The present year has witnessed another change in the control, one commissioner having been substituted for the four, who is virtually made the chief of the department.

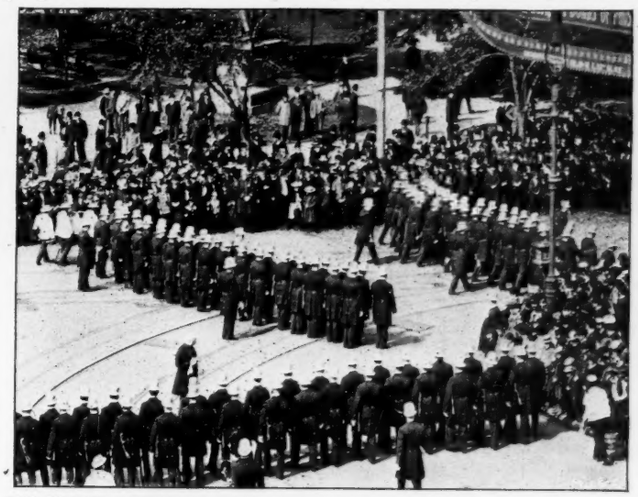
There is a contrast between the police force of New York as it stands to-day and the "rattle watch" of a century and a half ago. To-day the total members of the department number 7,241. There are besides fifty-six matrons and twenty-one surgeons. There is included in the department the most effective organization of harbor police in the United States, and perhaps in the world. The members of this division patrol the waterways of the city constantly with one steamboat and a number of launches. The Broadway squad is known the world over as the finest lot of policemen that can be found, when

SOME OF THE PATROL WAGONS.

measured by general appearances and efficient service. There are 212 mounted policemen and a squad of bicycle policemen.

NATIONAL ASSOCIATION ENTERTAINED.

The organization, during the latter part of May, entertained, at its own expense, the National Association of Chiefs of Police of the United States and Canada. The one hundred or more delegates in attendance were treated to the best that money could buy. The programme included theatre parties, a trip to Coney Island, a visit to



THE SECOND BATTALION, INSPECTOR CROSS COMMANDING, WHEELING INTO TWENTY-THIRD STREET FROM BROADWAY.

the various institutions of the city, and a glimpse of the "elephant."

There are police departments which, all things considered, are more efficient than this, but none in the world is so expensive. It cost more than $11,000,000 to run the department last year, which is far ahead of London. But, on the other hand, there are conditions obtaining here which create expense, so that it is hardly fair to compair the department with any other.

A SHAKING UP IN OMAHA.

JOHN REDELL, who was chief of the fire department of Omaha for six years, recently lost that position through an unusual combination of circumstances. Some weeks ago charges of brutality and profanity were filed against Redell with the Board of Fire and Police Commissioners by members of the department, and the board set a date for hearing the charges. Redell, believing that the Fire Commissioners meant to discharge him, whether or not the charges were proved, went into court and questioned the constitutionality of the act giving the board the right to try him. The court declared the law invalid, and Redell for a day or two believed he had won a good victory, and then the City Council met in special session and received from the Mayor the appointment by him of an entire new fire department. The power of the Board of Fire and Police Commissioners to appoint and discharge firemen having been denied by the court, in the case instituted by Redell, it followed that the Mayor must exercise the appointing power in regard to members of the fire department. In appointing the new department, Mayor Moore named Charles A. Salter as chief and did not even mention the name of John Redell.

Redell was a battalion chief of the Chicago department six years ago, when he was selected to head the Omaha fire fighters. During his service in Omaha he has had to combat the sentiment that always exists against an "imported man," but his record as chief was nevertheless a brilliant one. His successor, Mr. Salter, has been first assistant chief for a number of years, and acted as chief for a short while prior to Mr. Redell's appointment.

DUTIES OF THE MODERN POLICEMAN.

Criminal Classes Natural Enemies—Thorough Organization Necessary—Must Secure Evidence—How to Pump a Prisoner.

BY BENJAMIN MURPHY.*

BENJAMIN MURPHY.

ONE of the oldest rules in the police manual is the one that says, "The absence of crime is the best evidence of the efficiency of the police." To be sure, no fair-minded person expects the police to entirely suppress crime, for it has existed since the world began, and it is safe to say there will be wrongdoing to the end of time.

It is the duty of the police to keep the criminal classes under such strict surveillance that it will be difficult for them to commit crime and avoid arrest and punishment. A knowledge of a certainty of punishment for violating the law has a wholesome restraint upon the community at large and forces the criminals to behave themselves, thus very materially aiding the police in the line of their duty.

CRIMINAL CLASSES NATURAL ENEMIES.

The criminal classes are the natural enemies of the police and of society. They devote their time in studying how they can thwart the police in their efforts to suppress crime; it is, therefore, our duty as police commanders to devise plans to successfully meet all new schemes and devices throughout by lawbreakers.

The old threadbare saying that it takes a thief to catch a thief is nonsense and has been exploded long ago. The police commander who is a success is he who from years of experience has become familiar with the habits and workings of all classes of criminals and who is fortunate in being backed up by his superiors in his efforts to protect life and property and enforce laws in his jurisdiction.

THOROUGH ORGANIZATION NECESSARY

To prevent crime a police force must be thoroughly organized, well uniformed and equipped, rigidly disciplined and supplied with all modern electrical appliances. Patrol wagons should be attached to each station, ready as fire apparatus are to move out at a moment's notice on call from signal station. Patrolmen should be carefully instructed how to patrol their posts so it will be difficult for criminals to operate without being detected. When a patrolman answers return roll call with a knowledge that no crime was committed during his tour, he is to be commended for doing all that is expected of him.

Policemen should be men of good character, mentally and physically of a high standing. Superior officers should come up from the ranks for merit only and be required to possess a knowledge of criminal law and its procedure. With such a police force crime would be scarce and life and property well taken care of.

MUST SECURE EVIDENCE.

Next to the prevention of crime, it is the duty of the police to secure proper evidence to convict those guilty of crime, for should criminals know that the work of the police ended when they get a prisoner to the station house a bad state of affairs would indeed exist. As you gentlemen know, it is after the arrest, in many cases, that the ability of the police is put to the test.

Old offenders do not often tell on themselves and, fortunately, very often citizens who can give evidence are apt to keep away from the police to avoid annoyance. From the moment a person is taken into custody for a high misdemeanor the arresting officer should take notice of all the prisoner says and does while on the way to the station house, and on arriving there the prisoner should be carefully searched and everything taken from him that might be of use for the prosecution. Papers and weapons should be carefully marked for identification by the arresting officer.

HOW TO PUMP A PRISONER.

The prisoner should then be taken to a private room and a superior officer should proceed to take a written statement from him. The prisoner should first be warned that what he says must be voluntary and of his own free will, that it will be taken down in writing and will be read over to him when complete and used at his trial on the charge for which he is in arrest. This statement should be taken down in the presence of one or more witnesses and be signed by the prisoner, after which it should be sent to the prosecuting attorney. After such a caution every effort and means permitted by law should be resorted to, to get evidence against the accused.

No police officer need fear that he will get into trouble for his efforts to get confessions from persons guilty of crime. It is his duty to do it and so long as he confines himself to the requirements of the law in such cases he need not mind what a criminal lawyer may say at the trial. In my service of twenty-eight years I have never known a person not guilty of crime to incriminate himself by anything he might say. On the contrary, I do know that very few are convicted of serious crime where police officials are indifferent or negligent in getting statements from the accused when they are first arrested. Criminals do not commit crime in the presence of witnesses, if they can avoid it, and therefore it is our duty to get admissions from them if we can do so.

Witnesses in all high crimes should be brought to the station house as soon as possible after the commission of crime and their evidence taken down in writing so they may be more apt to testify to it at the trial. Too many guilty persons escape conviction and punishment for their crimes by lack of energy when the crime is first reported. Promptness of action by the police is invariably crowned with success.

* Chief of Police of Jersey City, N. J.

MORRISTOWN'S FIRE RECORD.

MAYOR NORMAN FOX, in his recent message to the new Board of Aldermen, calls attention to the remarkable exemption of the town the past year from serious fires. There were twenty-eight still alarms, but only ten general alarms, and at not more than half of these was there a damage amounting to a hundred dollars. The total loss of property from the fires of the whole year was not more than $2,500. It may be questioned whether there is another town of a population of 12,000 in the whole country that has such a record. The mayor asserts that this exemption from conflagrations is due not simply to good luck, but rather to the efficiency of the fire department in taking things at the start. The property owners in Morristown are beginning to claim that insurance should be furnished them cheaper than in other places. The houses of Morristown are principally elegant country villas surrounded by extensive grounds. The villas are for the most part entirely or partially constructed of wood. There are many whose destruction would mean a loss of many thousands of dollars because of the material of which they are made and the distance the department has frequently to go in answering calls, it is the more remarkable that the town has such an excellent fire record.

THE FIRE ALARM TELEGRAPH OF THE BISON CITY.

BY JAMES MALCOLM.*

In its fire alarm system the Buffalo Fire Department is said to be one of the most modern and best in the world. Electricity in this, as in nearly every line, has wrought wonders as an aid to quick and reliable service.

Within the last year two important improvements have been made at the central office.

A NEW CONTROLLING BOARD.

In the first place, the new storage battery controlling board, a cut of which is shown herewith, has a capacity of sixty-four circuits, while the largest board elsewhere in use for fire alarm does not exceed thirty. Not more than half that number of circuits is used at present in Buffalo, but it was considered wise to have a large board constructed to be ready as the city expands.

The board is a mechanical wonder and a thing of beauty to behold. Its function is to control the electric currents between the storage battery and the various lines of alarm and communication spreading all over the city.

From this board are controlled twenty-nine signal lines, four talking circuits and four "joker" lines. The "joker" lines are those through which all engine houses are alarmed simultaneously, the instant an alarm is given at any one of the boxes throughout the city.

NEW STORAGE BATTERY, BUFFALO FIRE DEPARTMENT.

From this board are controlled twenty-nine signal lines, four talking circuits and four "joker" lines. The "joker" lines are those through which all engine houses are alarmed simultaneously, the instant an alarm is given at any one of the boxes throughout the city.

At each engine house the firemen are notified of every fire in the city, whether it be in their district or not. Except in emergencies each engine is required to attend fires only in its district.

The number of engines which must make a run is governed by the location and the seriousness of the conflagration. In one part of Buffalo, for illustration, the first alarm calls out five engines and two fire boats; the second, five more engines, and the third alarm five more, making in all fifteen engines and two fire boats.

Outlying districts do not need more than two or three engines at each alarm.

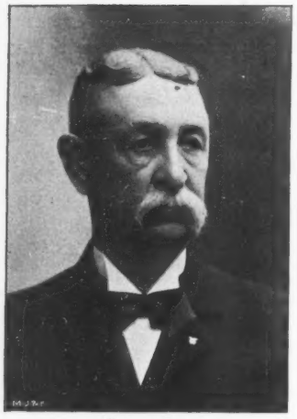
THE STORAGE BATTERY.

The other improvement recently made in the department is the substitution of a storage battery for the gravity system. A picture of the battery room accompanies this article and shows several innovations. Each storage cell has a useful capacity of fifteen amperes, whereas the usual capacity is seven amperes hours for the alarm use.

There are about 1,000 of these cells in this room and the system has been found a great improvement over the old style. While the gravity system formerly cost the city $2,500 a year for maintenance, the present one is maintained for about $300 a year. Although the new plant cost about $12,000 for installation it may be readily seen that the improvement will soon pay for itself.

CONTROLLING BOARD, BUFFALO FIRE DEPARTMENT—LARGEST IN THE WORLD.

* Buffalo, N. Y.



HENRY SMITH,
Chief Operator.

AN INVENTIVE OPERATOR.

Henry Smith, for thirty-four years connected with the department, is the chief operator at headquarters and has been the inventor of several useful devices used in the electrical equipment. One of these, a telephone connection between headquarters and the 555 alarm boxes in the city. This constitutes an independent telephone system for the department by a single contrivance of attaching telephonic apparatus to the alarm wires.

When men are out repairing the boxes they can thus be communicated with at any box and a vast amount of time and trouble are saved.

Mr. Smith also claims to have a superior system for locating breaks on the signal or box lines, alarm joker and talking circuit. From the central office they can locate directly either a break or a ground. Under the old plan a man had to be sent to every engine house or signal box and test the wire before the break could be located. The saving of time and expense by the new arrangement can be appreciated only by electricians.

Opal covers for the storage cells, which are regarded as the best now in use, have also been invented by Mr. Smith. Cork and oil are used in some other storage batteries, but they are disagreeable to handle, while the opal covers prevent spraying in the room while the batteries are being charged, and are always clean to handle. Each cell stands in a separate glass saucer or holder, as an improvement over the glass bases of one piece extending beneath several cells.

AN EFFICIENT DEPARTMENT.

From the chief down to the rank and file the Buffalo Fire Department is considered one of the most efficient in the country. Politics do not harrass the men in doing their duty nor impair their usefulness.

The direct administration of the department is under control of three commissioners appointed by the Mayor, and the men are all protected by a civil service law.

In all about 500 men, including officers, are employed in the department. These are used to man twenty-six fire engines, two fire boats, twenty-seven hose wagons; six two-horse, two cylinder chemical engines, nine hook and ladder trucks and one Hale water tower, with five steam fire engines, one two-horse, two-cylinder chemical engine and one hook and ladder truck in reserve.

During the year 1900 there were 1,055 alarms, involving a loss of $1,023,650.26, divided as follows: On buildings, $469,183.75; on contents, $554,474. Salaries for the year amounted to $440,462.90.

NEXT MEETING OF MUNICIPAL ELECTRICIANS.

THE general invitation of the International Association of Municipal Electricians is extended to all in the profession, and it is made broad enough to include any of their friends. President Morris W. Mead, superintendent of the Bureau of Electricity of Pittsburg, writes that a rich programme is being arranged for the convention which will be held at Niagara Falls, September 2d, 3d and 4th, 1901. This will be the sixth annual meeting of the association, and it promises to be one of the best ever held.

Superintendent Frank C. Mason, of the Police Department of Brooklyn, informs us that special rates have been secured over the leading railroads, good for five, ten or fifteen days. A special train will leave New York Sunday evening, September 1st, while a special car will leave Friday evening, August 30th, giving all who desire it the full benefit of the Labor Day period. Further particulars can be secured by addressing F. C. Mason, 16 Smith street, Brooklyn, N. Y.

COMPULSORY USE OF ELEVATOR AIR CUSHIONS.

IN these days of tall buildings the elevator is an absolute necessity and, therefore, any regulation which tends to better the service or make it safer, is to be commended. The wonder is that so few accidents occur. The rules and regulations which Philadelphia has had in use for some time respecting the inspection of elevators are well worthy of imitation. Among others is a compulsory feature relating to the use of air cushions. The rule is as follows: "All passenger elevators must be provided with air cushions when, in the judgement of the inspectors and the chief of the Bureau of Building Inspection the same shall be considered necessary.

"If the shaftway of any passenger elevator is so located, or the motive power is so limited in range, as to make a basement air pit impracticable, the air pit must be constructed above the first floor."

HONOLULU FIRE DEPARTMENT.

HONOLULU has a fire department of which any older city belonging to the United States might well be proud. Its work was never more efficiently shown than during the presence of the plague a few months ago, when it was employed at the risk of life and limb, not only from fire fighting, but from a hand to hand fight with the plague. It is said to the credit of the members of that department that they performed their duties bravely and without flinching.

The capital city of Hawaii has 159 miles of well lighted streets, paved with telford or macadam mostly, but it has a few miles of more expensive pavements. It is possessed of one of the finest water works plants that can be found anywhere in the United States. And it is thoroughly adapted to the needs of the city for fire protection, as it maintains a high pressure at the hydrant at all times. Thus far the government of the municipalities of Hawaii has been that of the state only, which may account for its greater freedom from jobbery and the uniform good government that is maintained. Governor Dole said, in a recent letter to the MUNICIPAL JOURNAL AND ENGINEER, that a movement was on foot among the leading citizens which would soon lead to the establishment of a municipal government in all the cities and towns of Hawaii.

CENTRAL STATION, HONOLULU FIRE DEPARTMENT.

That the members of the fire department are well housed and cared for will be attested by the general appearance of the central fire station, as shown in the accompanying illustration. It is built of island stone and conforms to the prevailing type of architecture found in Hawaii, two stories in height and well equipped with modern fire fighting apparatus.

CIVIL SERVICE DOES NOT APPLY.

THE Supreme Court of California has decided that the civil service provision of the charter does not apply to deputies or employees in country offices. This is the interpretation placed upon the case of Crowley vs. Freud by Judge Seawell. Thus, any county officer can replace any civil service men by men of his own selection.

FIRE DEPARTMENT ITEMS.

—An ordinance was introduced into the Council at Wheeling, W. Va., increasing the salaries of the firemen from $60 to $65 per month. Objection was made to it, and it has been laid over.

—High pressure water mains for fire protection are being laid in Philadelphia. Until the great pumping station on the Delaware is completed, fire boats will furnish the necessary high pressure.

—The report of the Dallas, Tex., paid fire department shows that there was 317 alarms of fire, sixty-five more than last year. Of these 224 fires were confined to buildings. The total loss was $213,054.73.

—The request of the Camden, N. J., firemen for an increase of $5 a month in their pay has been considered by the fire committee of the City Council, and they have decided that it will be impossible because of no provision in next year's budget for an increase of the appropriation for the department.

—The city of Tampa, Fla., has an ordinance requiring everyone to secure a permit before building, whether within or without the fire limits. Since last November, when the ordinance was passed, the permits have brought in a large amount of money. May had the largest monthly total, being that of $48,277.

—The committee of the City Council in Des Moines, Iowa, expect to recommend many things to the legislature toward changing the laws governing the municipalities. One change proposed is to take the police and fire departments out of politics and have them governed by a non-partisan police and fire commission.

—On the 9th of June, the firemen of Newark, N. J., observed their memorial day. A parade was held in the afternoon, which marched to the cemetery, where flowers were strewed on the graves of the departed brothers. A year ago the department instituted this custom in Newark, but many other places have observed the custom for some time.

—Mayor Harrison, of Chicago, submitted the name of William H. Musham to the City Council as the successor of Chief Swenie, of the Fire Department, recently resigned. The appointment was promptly approved. Next to his chief, Mr. Musham is the oldest man in the department, and was first assistant chief, so it was natural that he should receive the appointment.

—Chief Croker, of the New York Fire Department, has issued minute instructions for the care of horses after coming from fires. They must be sponged and showered and made comfortable. A length of small hose must be attached to hydrants for the use of the public, and the Chief calls attention to the fact that the public can always use the fire hose for watering their horses.

—Denis G. Swenie, Chief of the Fire Department of Chicago, has resigned after half a century of service. A medical examination by his physicians showed him no longer capable of properly performing his duties. He was born in Glasgow in 1834. In 1849 he came to America and became a volunteer fireman, and has been a fireman ever since. He organized the paid fire department of Chicago, and has been its chief since 1879.

—Manila is to have a new fire department. The old department consisted of three stations fitted with old-fashioned machines. The Philippines Commission has determined to spend $70,000 for a thorough renovation. Six stations are to be installed with the necessary fire apparatus and American engines. An alarm system will also be put in, and the department will be commanded by an American chief and captains, but with native lieutenants and subordinates. It is also proposed that the new department absorb the Foreigners' Volunteer Fire Department, which was formed soon after the visit of the Taft Commission.

MUNICIPAL MATTERS DETERMINED IN COURT.

WALK NOT SAFE.

ACCORDING to the Supreme Court of Michigan, where a flagstone in a sidewalk is broken, causing a depression of from two to five or six inches, it cannot be said that the walk is reasonably safe and fit for travel.

CURFEW ILLEGAL.

THE ordinance adopted by the West Springfield town meeting on April 1, whereby no one under sixteen years of age could remain in the streets after 9 o'clock at night, was declared illegal by Judge Hopkins of the Supreme Court.

FRANCHISES NOT TAXABLE.

UNDER the laws of Texas, the taxation of a corporation's franchise in addition to the tax on its real property is illegal. The Supreme Court has decided that, without their real property, corporations are lifeless and that, to tax their franchise would be double taxation.

NO PERMITS FOR STREET STANDS.

THE Appellate Division of the New York Supreme Court has decided that the Municipal Assembly of New York City has no right to issue permits for street stands outside the stoop lines. The Court held that the charter repeals Chapter 718 of the laws of 1896, which gave the assembly that right.

IMPAIRMENT OF CONTRACT.

THE Appellate Division of the Supreme Court of New York has upheld the decision of a lower court that an act of April, 1900, forbidding the rendering of swill, garbage or offal in Brooklyn borough is unconstitutional, because it covered only a part of the city and impaired contracts made with the former cities of New York and Brooklyn for five-year terms with the Sanitary Utilization Company, whose half-a-million-dollar plant is on Barren Island.

AMBIGUOUS ILLINOIS STATUTE.

THE Supreme Court of the United States has sustained the Illinois Supreme Court in its decision against the Freeport Water Company. A law of the State of Illinois, passed in 1872, authorizes city and town officials to contract for a water supply for a term of thirty years and the water company claimed that ordinances fixing rates were in the nature of contracts for thirty years. When by ordinance the rate for each fire hydrant was reduced from $75 to $50 a year the water company sued the city of Freeport. The Supreme Court said the statutes were ambiguous, but it had been thought best to decide the ambiguity in favor of the public.

REIMBURSEMENT FOR REPAIRS.

A RECENT decision of the Supreme Court of Louisiana states under what conditions a town may obtain reimbursement from contractors for repairs to a water works and electric light plant after the plant has been accepted by the town, subjected to contract tests, and certified to as to its completeness in accordance with contract by an engineer agreed upon by the parties. The decision holds that the town carries the burden of establishing clearly that the expenditures were for repairs for which the contractor was liable under his contract; that the claim of the furnisher of supplies to be used in the construction of a building to a privilege upon the building is dependent upon the supplies furnished being actually used in the building; that it is not sufficient that the contractor, after disposing of the supplies in some other way, should substitute in replacement thereof other articles of the same kind and of the same quality obtained from other sources, and that where the furnisher of supplies for the construction of a building waives his claim to a privilege upon the building, and relies under the act of 1844 upon a right on the price due by the owner to the contractor, he must comply with the conditions of that statute and serve an "attested account" as required by its terms, but that the recording of an attested account in the recorder's office is not the equivalent for the purposes of a right upon the fund to the service upon the proper party of an attested account.

FOOT FRONTAGE BASIS FOR TAXATION.

THE United States Supreme Court has declared unconstitutional the ordinance passed last fall in Detroit, providing for the assessment of taxes for paving on the basis of benefit received instead of foot frontage.

The test case was that of R. A. Parker vs. Detroit. The plaintiff sued to have set aside the special assessment against his property for street paving on the ground that an assessment based upon lot frontage was unjust and unconstitutional. His position was sustained by Judge Swan of the United States District Court. The decision reversing Judge Swan's was written by Mr. Justice Shiras, and concurred in by six of the nine judges. The opinion is one of considerable importance outside of Detroit, as many property holders were awaiting a favorable decision to institute suits against their municipalities on the same grounds.

In Detroit it will necessitate the repeal of the ordinance passed last fall providing for assessments according to benefits received, whatever they may be. Special assessment rolls prepared in accordance with this law will have to be cancelled and new ones made out on the basis of foot frontage.

MAY OPERATE DURING A STRIKE.

THE Supreme Court of Minnesota has held, in the case of Fewings vs. Mendenhall, receiver, that a street railroad company is not guilty of negligence for running its cars during a strike, unless the conditions are such that it ought to know or to reasonably anticipate that it cannot do so. At the same time it must guard from violence by the exercise of the utmost care those who accept its implied invitation to become passengers. The case was brought by a person who was struck with a stone while riding in a car during the strike of 1898 in Duluth.

MUNICIPAL BOND SALES FOR JUNE.

Philadelphia Fails to Sell Its Bonds, Only One Bid of $5,000 for a Total of $9,000,000—Bond Sales of the Month Likely to Exceed Those of Same Period Last Year.

THE bond sales for the month of June have been much better than it was anticipated they would be. The quieting down of the stock market has, doubtless, had some influence in augmenting the sales. The total will, it is likely, exceed $26,000,000 for the month, which will beat the phenomenal record for the corresponding month a year ago.

The most notable event in the market was the failure of Philadelphia to dispose of $9,000,000 worth of 3 per cent. Filtration bonds. This city no longer stands at the head of the list of American municipalities as a first-class borrowing power. The attempt to negotiate a $9,000,000 loan at 3 per cent. for the improvement of the city's water supply failed dismally when only one bid—a meagre offer to take $5,000—was received by Mayor Ashbridge.

Of all the big municipalities of this country, Philadelphia in the past has borrowed money at a lower rate of interest than almost any other city. The present signal failure to secure a loan on the terms named by the city is without precedent in the history of Philadelphia, and the authorities are deeply chagrined.

It is not at all improbable that the wanton outrage of the Mayor in giving away franchises which were worth millions, and for which $2,500,000 had been offered, influenced the market against the Quaker City.

PURCHASER.	PURCHASE.	INT. RATE.	TERM, YEARS.	AMOUNT.	PRICE.
Aledo Bank	Aledo, Ill., City	5 per cent. a.		6,000	104.33 1-3
Appleton State Bank	Granite Falls, Minn., Water Wks. & Elec. Lgt	4½ per cent. s. a.	15	6,000	104.66 2-3
Croghow Bank, Fremont	Bellevue, O., Cemetery	4 per cent. s. a.		6,000	104.216
Dick Bros. & Co., Philadelphia	Coatesville, Pa., Refunding	3½ per cent. s. a.	30	76,980	104.365
Finn, Matthew, Detroit	Wyandotte, Mich., School	5 per cent. s. a.	13 Avg.	17,000	112 575
First National Bank, Local	New London, Ia., Electric Light	6 per cent. s. a.	8 1-3 Avg.	6,000	112.133
First National Bank, Youngstown	Vernon, O., School	5 per cent. s. a.	1—5 Ser.	5,000	104.63
Fourth National Bank, Local	Wichita, Kan., School	4 per cent. s. a.	10—20 Opt.	25,000	100.60
Kingston Savings Bank	Pine Hill, N. Y., Public Building	4 per cent.	5—9 Ser.	2,000	103.25
Local	Frenchtown, N. J., School	3 per cent.	9 1-3 Avg.	10,000	Par.
Mayer & Scheidegger—Bank of Chaska	Mayer, Minn., Village Hall	5 per cent. a.	2—5 Ser.	1,800	Par.
May, S. E., & Co., Local	Lewiston, Me., Refunding	3½ per cent. s. a.	30	185,000	108.9
Mysing, W. A.	New Orleans, La., Judgment	4 per cent. s. a.	17—35 Opt.	5,000	106.04
Mysing, W. A.	New Orleans, La., Judgment	4 per cent. s. a.	17—35 Opt.	5,000	106.00
Mysing, W. A.	New Orleans, La., Judgment	4 per cent. s. a.	17—35 Opt.	10,000	105.78
Mysing, W. A.	New Orleans, La., Judgment	4 per cent. s. a.	17—35 Opt	10,000	105.32
Neugass, H.	New Orleans, La., Judgment	4 per cent. s. a.	17—35 Opt.	50,000	107.25
Northern Pacific Bank	Brainerd, Minn., School	4 per cent. s. a.	20	10,000	Par.
Schenectady Savings Bank	Schenectady, N. Y., Street Improvement Notes	4 per cent a.	2¾ Avg.	5,200	101.346
Second National Bank, Local	Belvidere, Ill., Sewer	6 per cent. a.	3¼ Avg.	1,200	104.25
Seymour Bros. & Co., New York	Anciam, N. Y., Town	3.4 per cent. s. a.	1 2-3—9 2-3 Ser.	8,700	Par.
Sherrill, I. W., Poughkeepsie	Utica, N. Y., School	3½ per cent.	9 1-6 Avg.	35,000	100.10
Sherrill, I. W., Poughkeepsie	Utica, N. Y., School	3½ per cent.	9½ Avg.	25,000	100.10
Sherrill, I. W., Poughkeepsie	Utica, N. Y., Street Paving	4 per cent.	3½ Avg.	16,798	100.001
Soloman, A. J, Columbus	Butler, O., Electric Light	5 per cent. s. a.	10 5-6 Avg.	8,000	103.154
Stein, M. A., New York	Rome, N. Y., Street	3½ per cent. s. a.	1—5 Ser	30,000	100.46
Bechtel, G. M., Davenport	Jasper, Minn., Water Works	4½ per cent. a.	3—10 Ser.	3,000	103.375
Canadian Bank Commerce	Vancouver, B. C., City	3½ per cent. s. a.	40	230,000	90.43
Citizen's Bank, Local	Dansville, N. Y., Street	4 per cent. s. a.	5—9 Ser.	2,000	101.00
City Comptroller	Buffalo, N. Y., City	3 per cent. s. a.	1	18,000	Par.
Delray Savings Bank	Delray, Mich., School	3½ per cent. s. a.	10	45,000	101.055
Feder, Holzman & Co., Cincinnati	Berea, O., Water Works	4 per cent. s. a.	13—19 Ser.	10,000	100.04
Fireman's Pension Fund	Akron, O., Street	5 per cent. s. a.	3 1-12 Avg.	2,400	102.166
First National Bank, Local	Independence, Mo., Electric Light	4 per cent. s. a.	5—20 Opt.	30,000	101.51
First National Bank, Local	Niles, O., Sewer	5 per cent. s. a.	1—5 Ser.	1,500	101.926
Fulton, F. R., & Co., Chicago	Deadwood, S. D., Refunding	5 per cent. s. a.	10—20 Opt	22,500	102.977
Harris, N. W., & Co., New York	Paterson, N. J., Renewal	4 per cent. s. a.	10	38,000	104.670
Hoobler, Geo. W, Omaha	So. Omaha, Neb., Funding	4½ per cent.	10	50,000	100.626
Jose, Parker & Co., Boston	Stoneham, Mass., Water	3½ per cent. s. a.	7—24 Ser.	87,000	103.8763
Merchants' & Farmers' Bank, Local	Portsmouth, Va., Paving	4 per cent. s. a.	30	11,000	100.51
Providence Savings Bank & Trust Co.	East Liverpool, O., Street	6 per cent. s. a.	3 1-12 Avg.	5,225	105.974
Seasongood & Mayer, Cincinnati	Berea, O., Electric Light	4 per cent. s. a.	13—16 Ser.	2,000	100.034
Seasongood & Mayer, Cincinnati	Ogden, Utah, Refunding	4 per cent. s. a.	10—20 Opt.	30,000	100.000
Stafford, F. M., & Co., Chattanooga	Bristol, Va., Street	5 per cent. s. a	20—30 Opt.	15,000	103.33 1-3
Stafford, F. M., & Co., Chattanooga	Gastonia, N. C., Water, School and Elec. Lgt	5 per cent.	30	40,000	108.00
Bank of New Matamoras	New Matamoras, O., Water Works	5 per cent. s. a.	5¼—20 Opt.	10,000	105.1312
Bank of Ogdensburg—National Bank, Ogdensburg	Ogdensburg, N. Y., Water Works	3½ per cent. s. a.	4—20 Ser.	16,000	103.00
Dick Bros. & Co., New York	Plattsburg, N. Y., Refunding Water	3½ per cent. s. a.	1—25 Ser.	25,000	101.77
Dick Bros. & Co., New York	Trenton, N. J., Fire Engine	3½ per cent. s. a.	20	15,000	104.71
Groel, Adam H., Local	East Newark, N. J., Street	4 per cent. s. a.	20	56,000	103.75
Jose, Parker & Co., Boston	Somerville, Mass., Sewer	3½ per cent. s. a.	10 1-6 Avg.	146,000	102.689
Ohio National Bank, Columbus	Loraine, O., Sewer	4 per cent. s. a.	2 1-3 Avg.	6,500	100.23
Savings Bank, Local	New London, Conn., Water	3½ per cent. s. a.	25	100,000	105.67
Stimson, G. A., & Co., Toronto	Belleville, Ont., Water Works	4 per cent. s. a.	30	129,000	100.023
Third National Bank, Local	Atlanta, Ga, Water Main	3½ per cent. s. a.	30	120,000	103.60
Unknown	Sparks, Ga., School	6 per cent.	30	5,000	Par.

RECENT INVENTIONS.

673,868.—*Filtering System.* John C. Henderson, New York, assignor to the Maize Product Company, same place.

673,920.—*Excavating Machine.* James H. McKee, Chicago, Ill., assignor to Frederick C. Austin, same place.

673,923.—*Bascule Bridge.* John W. Page, Joliet, Ill.

673,925.—*Gate Valve.* James Powell, Cincinnati, Ohio.

673,937.—*Brick Carrier.* John H. Zirckel, Pittsburg, Pa., assignor one-half to Thomas Atchison, same place.

673,942.—*Fire Escape.* George O. Curtis and Charles R. Bolter, Logan, Iowa.

673,969.—*Trussed Ladder.* William J. Rutledge, Otisville, Mich.

674,045.—*Fire Hose Reel.* John H. Sullivan, Chicopee Falls, Mass.

674,089.—*Brick or Tile Covering for Beams.* Bernard Jacquart, South River, N. J.

674,104.—*Gas Producer.* William Swindell, Allegheny, Pa.

674,142.—*Apparatus for Purifying Water.* Louis E. O. De Voser, Schiedam, Netherlands.

674,153.—*Apparatus for Purifying Water.* Frank E. Bachman, Buffalo, N. Y.

674,283.—*Electric Lamp Socket.* John D. Pierce, Philadelphia, Pa.

674,287.—*Frame for Pavement.* George K. Tinker, New York, N. Y.

674,294.—*Garbage Holding Attachment for Sinks.* Charles E. Cox, Chicago, Ill.

674,296.—*Method of and Apparatus for the Manufacture of Cement Pipes.* Carl J. Kielberg, Hillerod, Denmark.

674,319.—*Refuse Crematory.* Ward Risley, Jacksboro, Tex.

674,340.—*Car Fender.* Archie W. Lindsey, Atlanta, Ga., assignor of one-half to Charles C. Chillingworth, same place.

674,343.—*Penetrating Hose Nozzle.* Elbridge W. Oakes, West Bay City, Mich., assignor of one-half to the Bay City Iron Co., same place.

674,371—*Spraying Nozzle.* Carl Altenburger, Des Moines, Iowa.
674,388—*Voting Machine.* William A. Swaren, Chicago, Ill.
674,404—*Ballot Box.* Charles E. Gierding.
674,415—*Tunneling Apparatus.* David L. Hough, New York, N. Y.
674,417—*Dredging Dipper Handle.* Patrick Howard, Brooklyn, N. Y.
674,425—*Brush-Cutting Machine.* Louis Nelson, Fresno, Cal.
674,439—*Water Seal or Trap.* John J. Foy, St. Louis, Mo.
674,477—*Hydrant.* Horace Lee, New York, N. Y.
674,514—*Ballot Box.* Thomas E McNulty, Cripplecreek, Col.
674,523—*Automatic Signal for Electric Railways.* Charles H. Storm, Waterloo, Iowa.
674,549—*Earth Auger Attachment.* Fred R. Wrenn.
674,584—*Fire Escape.* Charles R. Porter, Marion, Ind.
674,616—*Apparatus for Making Fireproof Walls in Wooden Buildings.* James A. McNamee, Cambridge, Mass.
674,672—*Paving Block.* Reuben D. Culver, Veedersburg, Ind.
674,695—*Apparatus for Making Coal Gas.* Edward M. Eidherr, Chicago, Ill.
674,696—*Water Supply Valve.* Henry Gardenier, Paterson, N. J.
674,703—*Road Scraper.* Edward P. Lynch, Salt Lake City.
674,705—*Ventilating Apparatus for Cars.* Thomas H. Mastin, Kansas City, Mo.
674,763—*Filter.* Charles R. Harris, Williamsport, Pa.
674,823—*Composition for Asphalt Pavement.* Joseph H. Auries, Philadelphia, Pa.
674,827—*Fire Extinguisher.* Albert W. Edmands, Lynn, Mass.
674,869—*Vote Recording Machine.* John E. Mander, Christchurch, New Zealand.
674,874—*Concrete Wall for Building.* Harmon S. Palmer, Chicago, Ill.
674,902—*Stuffing Box Packing for Coldwater Pumps.* Marcus Cohen, Mulheim, Germany.
674,928—*Pipe Coupling.* Max Muran, Niagara Falls, N. Y.
674,935—*Pipe Coupling.* Charles W. Meadowcroft, Philadelphia, Pa.
674,956—*Dumping Wagon.* Charles Carroll, Chicago, Ill.
675,007—*Machine for Spreading Liquid Cement.* Albert E. Johnson, Brockton, Mass.
675,035—*Machine for Mixing Concrete.* Chester T. Drake, Chicago, Ill.
675,036—*Apparatus for Handling, Mixing and Placing Material for Concrete Pavement.* Charles T. Drake, Chicago, Ill.
675,048—*Fireproof Window.* John C. McFarland and William J. Larkin, Chicago, Ill.
675,066—*Fire Alarm Device.* Nels Matlander, Minneapolis, Minn.
675,086—*Electric Railway Signal.* William H. Council, Williamsville, Ill.
675,101—*Water Meter.* Lewis H. Nash, South Norwalk, Conn., assignor to National Meter Co., New York, N. Y.
675,103—*Portable Fire Extinguisher.* Charles Nuring, Cincinnati, Ohio.
675,104—*Bracket or Support for Drain Pipe.* Jacob F. Oberle, New York, N. Y.
675,127—*Coupling for Conduit Outlet Boxes.* John A. Cole, Boston, Mass.
675,145—*Water Meter.* James A. Tilden, Hyde Park, Mass.
675,335—*Pipe Coupling.* Charles Luke, Milford, Conn.
675,342—*System of Plumbing.* Rowland J. Sayers, Newburgh, N. Y.
675,359—*Gas-Producer.* Geo. A. Orrok, Brooklyn, N. Y.
675,366—*Car-Seat.* Essington N. Gilfillan, Chicago, Ill.
675,367—*Car-Seat.* Essington N. Gilfillan, Chicago, Ill.
675,368—*Car-Seat.* Essington N. Gilfillan, Chicago, Ill.
675,397—*Dust-Collector.* Orville M. Morse, Jackson, Mich.
675,399—*Guard.* A. E. McCormack, Lachine, Canada.
675,402—*Fireproof Construction.* William Orr, Trenton, N. J.
675,403—*Fireproof Construction.* William Orr, Trenton, N. J.
675,410—*Fare-Register.* Chas. E. Pratt, Chicago, Ill.

PEOPLE WHO MAKE THE MODERN CITY POSSIBLE.

Immense Contracts for Municipal Work—Large Quantities of Supplies in Demand—Manufacturers Working Overtime—Orders for Months Ahead.

A BEAUTIFUL SOUVENIR CLOCK.

THE Thompson Meter Company, of Brooklyn, N. Y., had, perhaps the most expensive souvenir at the American Water Works Convention, among the many beautiful things offered by rival concerns. It was a perfect gem of a small sized clock, with a gilded metal case, which gave to it a rich, handsome effect. The clocks were in great demand and the supply was soon exhausted. The requests for these beautiful souvenirs, however, continue to arrive every day, but as only a certain number were manufactured for this especial meeting and as the last one has been given away, it is with regret that the Thompson Meter Company announces its inability to comply with the requests, simply because the supply is exhausted.

TELEPHONE POLES IN CITIES.

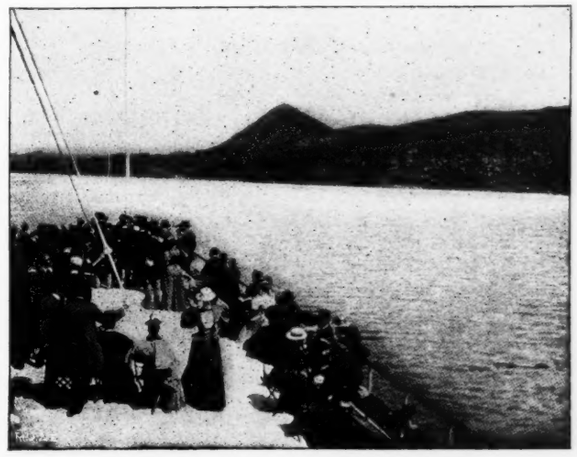
THE Supreme Court of Minnesota decides that a telephone company has the same right to erect poles in the city as upon rural highways; that the city has no authority to arbitrarily order the removal of such poles and wires. The city may, however, regulate the placing of poles, and, what is more to the point, compel companies to place their wires in sub-surface conduits when reason, convenience or good government so require.

THE HUDSON BY DAYLIGHT.

THERE is only one way to see the marvelous beauty of the Hudson River, and that is to take the Albany Day Line. Visitors to the Pan-American who have not had the delightful experience of a trip up or down the Hudson should not fail to take this ride. It is within a few hours of Buffalo and the most direct route to New York City.

The entire distance between Albany and New York is one long panorama of varied scenery of most exquisite beauty, while history has combined with romance, story, legend and art, to encircle each scene with a halo of light that will shine as long as books are read and the fire of patriotism burns within the breasts of our countrymen. There is no region in the world which more fully abounds with the picturesque.

While it takes nearly a full day to go from Albany to New York



SUGARLOAF MOUNTAIN—THE HIGHLANDS.

by this line, yet the changing scenes are so entrancing and the comfort of the passenger is so thoroughly provided for in every way imaginable, that it is restful rather than fatiguing.

Full particulars about the time table, fare and so forth are fully explained in a beautifully illustrated tourist's book, which may be obtained by addressing Mr. F. B. Hibbard, General Passenger Agent, Desbrosses Street Pier, New York.

SUCCESSFUL USE OF AIR COMPRESSORS.

Air compressors are successfully used for operating rock drills and coal cutters in mines, operating pneumatic tools, general service in railway shops, foundries, blast furnaces, machine shops, and so forth, and they are also coming into general use by municipalities for pumping water for lifting sewage from the low mains to the high mains.

We illustrate herewith a steam actuated Duplex Air Compressor of an improved type.

These compressors are of the mechanically operated inlet valve type, the inlet valves being of the semi-rotative type, actuated from a wrist plate; the ports through the valves are of extra large size, and the working parts of the mechanism are reduced to a minimum point.

The discharge valves are of the poppet style, the valve seat, valve and spring being of the best tool steel.

The valve seats can be readily removed for inspection, small hand hole plates being placed over the valves, which further facilitates inspection.

The seating of the valves in this machine is not accompanied with that noise which has been found heretofore so objectionable. Extra care has been exercised in the design to provide a water jacket that would give the best possible results.

The steam cylinders are outboard, and the compressor can be readily changed to one of the belt-actuated type by simply removing the steam cylinders. The air cylinders are connected to the steam cylinders and to the tangye bed by heavy cast iron yokes, the design of which gives easy access to the rod glands.

The compressor is entirely self-contained, being mounted on a heavy bed-plate, while the bed which carries the cross-heads and main shaft journals is of the most improved style of tangye type. The machines are exceptionally heavy, no expense being spared in the design or weight to give all the strength needed.

The design is a clean and compact one and further information will gladly be given by the manufacturers, the Stillwell-Bierce & Smith-Vaile Company, Dayton, O.

THREE MILLION GALLON FILTER PLANT.

The Pittsburg Filter Manufacturing Company, Pittsburg, Pa., has been awarded the contract for a three million gallon filter plant for the Citizen's Water Company, of Washington, Pa.

This plant will be of the gravity type and has provision for either clarifying or softening the water, at the option of the users.

This same company has also been awarded the contract by the Indianapolis Water Company, Indianapolis, Ind., for a 3,000 horse-power ideal system of water purification. In addition to this it is building a special heater for the Indianapolis company. The apparatus is designed not only to remove the lime and other scale-forming properties from the water, but also to remove the grease and fatty matter from the condenser water, in which direction it has been very successful.

ERICSSON TELEPHONE AT PAN-AMERICAN.

We have been informed by the Ericsson Telephone Company, 296 Broadway, New York city, that the Ericsson telephone was awarded first prize at Paris, 1881; Madrid, 1883; Vienna, 1884; Stockholm, 1886; Copenhagen, 1888; Chicago, 1893. Also that its exhibit in Paris in 1900 was from the St. Petersburg, Russia, factory, which was also awarded first prize. This year its exhibit of a fifty-subscriber switchboard and a few of their different telephones at the Pan-American Exposition at Buffalo is made in Section S of the Electricity Building, and Mr. W. Jac Marland will have charge of the exhibit.

Through us the company extends to all its friends and patrons a cordial invitation to see its exhibit. This exhibit is in connection with others in a collective electrical exhibit which will doubtless prove of interest to many of our readers.

THE BEST HOSE COUPLING.

For the best possible protection against fire, the Buckeye Engine Company, of Salem, O., was equipped six years ago with all the best known appliances of that time for fighting fire. That, of course, included the common screw couplings on their fire hose, but having witnessed the operation of the improved couplings, now pretty well known as the "Quick-as-Wink," at fires in Salem and other cities during the past five or six years, it became convinced of the reliability and greater convenience of the new kind of couplings. For this reason it has thrown out the old style and had "Quick-as-Wink" put in its place, on account of the quicker action and greater convenience afforded in handling hose. The order has been placed with the W. J. Clark Company, of Salem, for the improved couplings.

LARGE ORDERS FOR CAR FENDERS.

The Consolidated Car Fender Company, 39 Cortlandt street, New York, manufacturerers of the well-known Providence car fender, reports some very large orders during the month, among which is an order for ninety double equipments (180 fenders) for electric cars in Lisbon, Portugal.

AN EXTINGUISHER THAT EXTINGUISHES.

The value of the "Rex" fire extinguisher as a means of protection, and the simplicity and efficiency of the "Rex" hand chemical engines, is shown by the recent adoption by the Board of Managers of the National Home for Disabled Volunteer Soldiers when they placed their order with the Rex Fire Extinguisher Company, of New York, for seventeen of their two-cylinder hand chemical engines, as well as three hundred of their three-gallon copper "Rex" hand extinguishers for distribution among the various branches of the homes situated from Maine to California.

The Rex Fire Extinguisher Company has made steady progress in spite of great competition, and has made a name for its goods that stands second to none. It is making large shipments abroad, one of its engines being sent to India, and several to Mexico and South American countries.

The test of time has demonstrated that the "Rex" is a reliable extinguisher and parties who years ago equipped their factories and plants with them are now increasing their equipment as their plants increase with the prosperous times.

The famous Long Branch summer resort is being equipped with incandescent street lamps of the most modern type. The installation is being made by the Boulevard Globe and Lamp Company, 136 Liberty street, New York, of which Mr. W. L. Dickel is the president and treasurer. Complete catalogues and price-lists can be had for the asking.

SOUVENIRS AT THE A. W. W. CONVENTION.

The Hersey Manufacturing Co., of Boston, presented members and their friends with a handsome paper cutter having a genuine rabbit's foot handle.

The Lead Lined Iron Pipe Co., of Wakefield, Mass., distributed among the members and their guests a twelve-inch ivory foot rule, folded in three for pocket use.

Mr. William Volkhardt, the superintendent of the Bristol Water Co., Stapleton, Staten Island, was one of the liveliest members of the convention, and spoke entertainingly of his experiences.

Mr. Philip Ely, of Bayonne, N. J., had on exhibition an appliance for tapping water mains without shutting off the pressure, which was the subject of much interest and discussion in the convention hall.

The Anderson Coupling Co., of Portland, Conn., gave away an aluminum luck-penny, the size of a silver dollar with a new one cent coin mortised in the center, surrounded by the maxim, "I bring good luck; keep me and never go broke."

The John Simmons Company was represented by a rubber tipped lead pencil with the name of the firm in gold lettering, and the National Meter Company were the recipients of many complimentary remarks, particularly by out-of-town members, for their very neat guide book and map of New York, bound in leather.

The Pittsburg Meter Co., Pittsburg, Pa., gave away a handsome leather pocket book.

H. Mueller Manufacturing Co., Decatur, Ill., presented its friends with a neat little pocket book for cards.

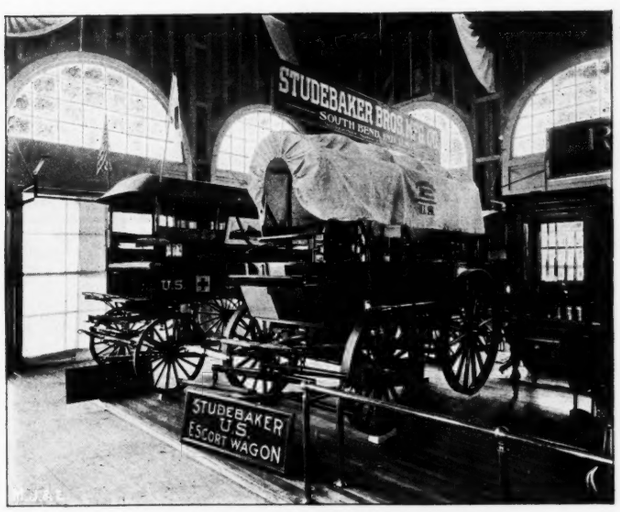
THE MANUFACTURERS AT THE A. W. W. CONVENTION.

Among those represented at the convention were the following: The Stillwell-Bierce & Smith-Vaille Co., of Dayton, O.; The Waterbury Tube Co., Waterbury, Conn.; Union Water Meter Co., Worcester, Mass.; Denver Union Water Co., Denver, Col.; A. P. Smith Manufacturing Co., Newark, N. J.; Neptune Meter Co., 253 Broadway, New York; Henry R. Worthington, 120 Liberty street, New York; G. F. Blake Manufacturing Co., 91 Liberty street, New York; Knowles Steam Pump Works, 91 Liberty street, New York; Deane Steam Pump Co., Holyoke, Mass.; Snow Steam Pump Works, Buffalo, N. Y.; Hill Manufacturing Co., 120 Liberty street, New York; The Laidlaw-Dunn-Gordon Co., Cincinnati, O.; Chicago Bridge & Iron Co., Chicago, Ill.; Ashcroft Manufacturing Co., 85 Liberty street, New York; The Hersey Manufacturing Co., South Boston, Mass.; McWilliams & McConnell, Shamokin, Pa.; Robert M. Kellogg, Metuchen, N. J.; Vincent Valve Co., Sandusky, O.; J. B. Campbell Brass Works, Erie, Pa.; Ross Valve Co., Troy, N. Y.; Hildreth Iron Foundry, Providence, R. I., and Venturi Meter Co.

STUDEBAKER EXHIBITS AT PAN-AMERICAN.

If it were not for the push and enterprise of the large manufactories of the country there would be little to attract the city official and others interested in modern apparatus to the Pan-American Exposition. It is because of the liberality of such immense firms as the Studebaker Bros. Manufacturing Company, of South Bend, Ind., which has installed several exhibits in the Transportation Building, Stadium, Government Building and elsewhere, that the Pan-American show has become one of the greatest successes in the exposition line.

These exhibits include a display of finely finished, high-grade vehicles, which have been acknowledged to be the most attractive at the Exposition. There are broughams, half-top park phaetons, breaks, depot wagons, traps, rubber-tired top buggies, park, mountain



STUDEBAKER EXHIBIT AT PAN-AMERICAN.

and business wagons, besides a full line of light and heavy harness.

There is no line of business or pleasure where wagons or harnesses are needed which is not well represented. The farmers of not only the United States, Canada and Mexico are provided for, but a wagon which is especially adapted to the needs of South America is on exhibition. In addition to these there are wagons which are adapted to every country in the civilized world.

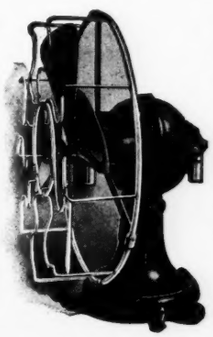
The civic affairs come in for their share of notice. Contractors' wagons and carts are on exhibit, together with ambulances, besides the regulation army escort wagon and army ambulance.

The four exhibits of the Studebaker Bros. will not fail to interest city officials, and it will be well to take especial notice of

STUDEBAKER EXHIBIT AT PAN-AMERICAN.

them. Every courtesy will be shown to visitors by those in charge of the exhibits and there will be an abundance of interesting printed matter relating to the operations of this great institution for free distribution.

REAL COMFORT.



In the warm Oriental countries the potentates and other men of wealth are obliged to have slaves stand behind them and move a large fan to keep them cool and to chase away the flies. In this country we can chase away the flies and the slaves, too, and have a regular gale always on tap, while every man, rich or poor, can be his own potentate so far as the coolness is concerned.

This is due to the introduction of the Lundell electric fan, which provides a perfect and economical means of ventilation. It gives real comfort at small expense and no trouble, and is suitable for any location.

Everybody can have a Lundell fan. If there is no lighting current in the building the fan can be operated from a storage or primary battery of only eight volts. The Lundell fan runs easily and noiselessly, and requires practically no attention. It only needs a little oil once a season. It is a perfectly safe fan. The blades are so securely fastened that there is not the slightest danger of their flying off. This is an important matter and every purchaser should see that the name "Lundell" is stamped on the base of the fan and not take chances on an inferior article.

Of course, every good thing is imitated and this fan has been copied but never equalled. It is the best fan ever made. It is superior in design and construction, is economical in current consumption and does not get out of order. It gives more breeze than any other fan and is the handsomest in appearance. Its success is shown by the fact that already 100,000 of them have been sold, and the demand is constantly increasing.

Why not get one this summer and be comfortable? No one who has used a Lundell fan could be persuaded to do without it now. It is not a luxury but a necessity to all who live in warm localities. Think it over.

Write for particulars to the manufacturers, the Sprague Electric Company, 527 West Thirty-fourth street, New York city.

HOW OLD IS CHINA?

CHINA'S antiquity is a part of its colossal proportions. Their early writers record a mythological history covering tens of thousands of years, but this period ends with the establishment of the capital of the empire at Kai-Fung-Fu in the thirty-first century B. C. Her legendary history extends from this time to 2205 B. C., at which time it may be said China's real history begins. The ancient history of China extends from 2205 B. C. to 298 B. C. Her mediæval history begins there and extends to the time of the Mongol conquest in 1215 A. D. With the founding of the Mongol dynasty, China's modern history begins. The Mongols were driven out by the Mings in 1368 A. D. The Mings were the last native dynasty that ruled over China, and their control lasted from 1368 to 1644. Under the title of the Ta Tsing (the Great Pure) Dynasty, the Manchus have ruled China since A. D. 1644.—*From No. 28 of the New York Central's "Four Track Series."*

No. 28 of the "Four Track Series" will be sent free, postpaid, to any address, on receipt of five cents in postage, by George H. Daniels, General Passenger Agent, New York Central, Grand Central Station, New York.

CHARLES GOBRECHT DARRACH, C. E., M. E.

CHARLES GOBRECHT DARRACH, C. E., M. E., was born in 1846 in the city of Philadelphia. His father was Prof. William Darrach, M. D., of Scotch-Irish extraction. Mr. Darrach's earliest ancestor in this country was Mr. William Bradford, who introduced the art of printing on this side of the Atlantic and who came to this country with William Penn in 1682. Mr. Darrach's maternal grandfather was Christian Gobrecht, who designed and engraved dies for the silver coinage of the United States which was used from 1836 to the advent of the Bland dollar in 1873, the smaller coins until 1893.

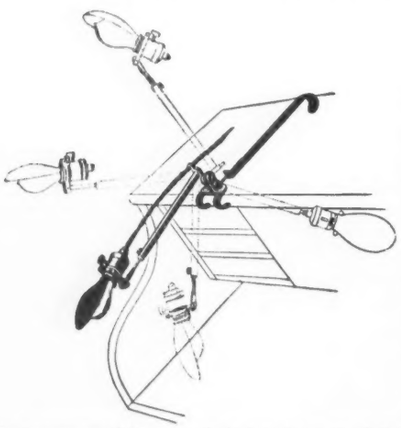
Mr. Darrach has been in the active practice of his profession since 1866. Until 1875 he was engaged in railroad location and construction. From 1875 to 1886 he was principal assistant of the Philadelphia Water Department, during which time he brought the famous lawsuit of the East Park reservoir to a successful termination, saving about $150,000 to the city.

Since 1886 Mr. Darrach has been engaged in the general practice of municipal, civil and mechanical engineering. Following is a partial list of work designed and executed under his direction.

One of the principal studies of Mr. Darrach's engineering has been to obtain results which are most efficient at the lowest cost of operation.

Mr. Darrach has been a member of the American Society of Civil Engineers since 1876, is a member of the Franklin Institute of Philadelphia and the Historical Society of Pennsylvania, president of the Institution of Operating Engineers, etc., etc.

SOMETHING NEW IN A DESK LAMP.



THE Smith & Hemenway Co. is introducing the Ferguson Adjustable Lamp Bracket, which is one of the most novel and up-to-date roll-top desk lamps on the market. It is adjustable to any size roll-top desk or upright piano and can be fastened on without the assistance of screws or nails. The reflector can be placed at any desired angle to prevent a glare in the eyes. It is ornamental because it is handsomely finished in enamel and nickel. It is the most reasonable priced lamp on the market, and at the same time very durable. It is simple in construction and operation, and is quickly adjusted. There are no springs to get out of order or make bad contact. The accompanying cut illustrates a few of the angles at which it can be placed.

Illustrated matter and circulars of the lamp will be furnished to parties desiring same.

This is one of the young and enterprising houses in the tool line and has forged its way forward in the past few years so that the majority of the old houses have begun to wonder from what part of the country they came. They are the publishers of one of the most novel catalogues issued by any house that we know of. It is known as the "Green Book of Hardware Specialties." A copy of same will be sent free upon application.

THE GOODYEAR ENDLESS RUBBER TIRE.

THIS tire is constructed for use on all classes and weights of vehicles. It is made of a quality of rubber which exhaustive tests have proven to be the most durable. This tire is especially advisable on driving wheels, as it absolutely does not slip, being firmly anchored by cross wires and bolts. The wires cannot rust as they are vulcanized in the tire.

The "wings" on the side of the tire prevent rim cutting and keep out mud and water.

A great advantage in this tire is that a new thread may be vulcanized on when the tire is worn down.

There are no grooves cut in the side of the tire to weaken it. They are solid through to the base with strength to the full width of the base.

Some of the Goodyear Endless Solid Tires equipped on vehicles weighing 5,000 pounds have travelled many thousands of miles and show scarcely any wear. This proves it to be the most economical tire in the end.

CHRISTENSEN AIR BRAKES.

THE air brakes on the Boston Elevated Railway are samples of the latest developments in the art of brake devices of compressed air for railway cars. The brakes are arranged on what is designated as the multiple unit plan; that is, each car is a unit in itself, and a train of cars equipped in this manner when coupled together can be operated from either end of any one of the cars in the train. This type of brake was determined upon after exhaustive tests of all existing brakes of that class, and it was decided that the Christensen apparatus was the simplest, most durable and efficient of all.

As arranged for the Boston Elevated, the apparatus consists of an electric motor car compressor or pump, which is enclosed in a dust-proof housing and is suspended underneath the frame-work of the car. All of the motor compressors on a train are started and stopped at the same time by an individual governor on each car. One governor will throw all the other governors out of operation whenever the air pressure reaches the maximum point; likewise one of the governors will start all the other governors whenever the air pressure

reaches the minimum point. Each pressure delivers air into its own main reservoir under each car, and each of these reservoirs is connected by means of a pipe line running the entire length of the train. On the front end of each car a pipe connection is taken off from this main reservoir pipe line, which connects with the engineer's valve.

The Christensen triple valve is simple and compact in construction, and is eminently satisfactory for steam railway work as well as for this particular service. It has but three moving parts, no springs of any kind, and is anti-freezing. On account of the automatic feature of setting the brakes, should a train break in two, the brakes on both sections will be set on account of pulling the coupling hose apart.

The scope of the Christensen air brake is by no means confined to the heavy electric railway work, it having been adopted as a standard not only on the Boston Elevated, but on the electrical divisions of the New York, New Haven & Hartford, the Brooklyn Elevated, Kings County Elevated, the Metropolitan West Side Elevated in Chicago, Northwestern Elevated in Chicago, and part of the Lake Street Elevated in Chicago, the Elevated Railway in Kansas City, as well as on the trains of the Metropolitan Underground in Paris, and the trains of the city in South London, London, England, and it is in daily service also on the surface lines throughout the United States and has been adopted by a large number of roads in New England. The type of brake, however, used for the surface line cars is what is known as the straight air pattern, in which is also used a motor-driven air compressor, the motor of which is connected with the trolley current through an automatic governor which stops and starts the air compressor at the maximum and minimum pressures, the air being contained in a reservoir connected with the engineer's valve operated by the engineer.

The rapid development in electric roads towards heavy cars and higher speed has led to the introduction of the Christensen air brake for this service. It would not be possible to operate the present heavy cars at the present speed without this brake, and it can be safely said that the introduction of the Christensen apparatus has been the means of increasing the size and speed of all electric cars both in city and suburban service.

TRADE PUBLICATIONS.

—The Goodyear Tire and Rubber Company, of Akron, O., has isued a neat little pamphlet, illustrating and giving the price of its goods. Those interested should not fail to have this catalogue on file.

—The Sprague Electric Company's "Bulletin" for June tells an interesting story about the Lundell motors—in fact it tells all about them and gives a complete price-list. Address the Sprague Electric Company, New York city.

—The Barr Pumping Engine Company, of Philadelphia, Pa., has issued a small illustrated pamphlet, descriptive of the engines installed in the Washington, D. C., water works, in which is included a price list of its principal engines. It can be had for the asking.

—Those cities which contemplate installing asphalt repair plants will find it to their interest to send for the catalog of the Contractors' Tool Company, Philadelphia, Pa. It gives price and illustrations, when possible, of all the machinery employed in the use of asphalt and cement, both for contract and city work.

—Maignen's Filtration Company, 1310 Arch street, Philadelphia, Pa., contains much that will be of interest and value to every water works plant in the country. It is one of the many devices which is used nowadays to purify the public and private water supply. It is well illustrated and will be sent free of charge to any address.

—The Stilwell-Bierce and Smith-Vaile Company, of Dayton, O., have issued Catalogues 22 and 23, which tell all about pumping machinery and turbine wheels. They are profusely illustrated and are packed full of useful information which is of great value to people in this field. Copies of these catalogues can be had for the asking.

—The Bunnell Machinery Company, Old Colony Building, Chicago, Ill., issue a profusely illustrated catalogue which shows up all kinds of earth-handling and road-making machinery, including stone crushers, scrapers, graders, etc., etc. City officials who use any of this machinery would act wisely to secure one of these catalogues.

—The E. W. Vanduzen Company, of Cincinnati, O., has issued an attractive catalogue, well illustrated, giving a complete price-list. Besides it includes the names and addresses of thousands of their patrons and many testimonials. It would be worth while for fire commissioners, or any one else in need of bells, to send for this booklet.

—The illustrated catalog of R. D. Wood & Company, of Philadelphia, Pa., gives a large amount of valuable information concerning hydraulic tools, cranes and machinery. It is one of the trade publications which should find a place among the reference catalogs of the construction department of every city, large or small. If you do not happen to have it, send for it.

—"How to Use Portland Cement" is the title of a neat, 48-page booklet, well illustrated, and written by William G. Hartranft, of Philadelphia. It tells how to use "Old Dominion Portland Cement" to the best advantage in all kinds of construction work. Copies can be secured, gratis, on application to William G. Hartranft Cement Co., Real Estate Trust Building, Philadelphia, Pa.

—Most cities are finding it more economical to run their own stone crusher in the construction of macadam and telford roads. For this reason the civic authorities having such work in charge, will be interested in the catalogue issued by the George V. Cresson Company; it tells all about rock and ore crushing machinery, for fine or coarse crushing. A postal card request will bring it to you.

—The Otto Gas Engines have had an increasing patronage since 1876, the year of the commencement of the Otto Gas Engine Works, Walnut St., Philadelphia, Pa. From a small beginning the plant has grown to a capacity of 1,200 engines per year. The gas engine is now utilized for nearly every known kind of manufacture where power is needed. The general catalog of the above company can be had upon request, and special information regarding marine engines will be sent upon application.

IMPROVED VEHICLES FOR MUNICIPAL USE.

FIG. 1.

RESPONSIVE to the demand for improved methods of handling garbage, ashes and so forth, and for the use of park and highway departments, the Shadbolt Manufacturing Company, of Brooklyn, N. Y., has devised a dumping wagon which will greatly facilitate this work and enable any given appropriation to go further, both in amount and quality of service rendered. Fifty years' experience in building vehicles for handling merchandise is a guarantee of the workmanship, and extending demand and satisfactory results where introduced testify to the practicability of the Shadbolt system.

We illustrate some varieties in which the Shadbolt is built.. Combinations of devices and styles are made to suit requirements.

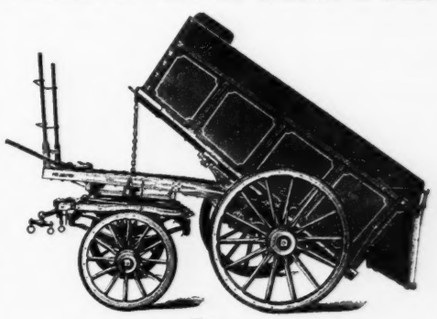


FIG. 2.

Figure 1 is an ash wagon, capable of carrying six cubic yards. There is a platform on the frame on which the driver can stand when dumping the load. Attention is called to the device for holding the tailboard in place. This is a bell-cranked hook, the upper portion of which is connected by a chain to the lower frace. As the body is tilted the distance between the back end of the body and the frame increases, thereby tightening the chain, which when a given distance is traversed by the body automatically pulls the hook out of the eye intailboard, and the tailboard being re-

leased, the weight of the load causes it to open and allow the load to pass out.

Figure 2. With this arrangement the driver can unload his wagon without getting off it. The floor of these wagons is lined with steel, so that the load will freely slide out.

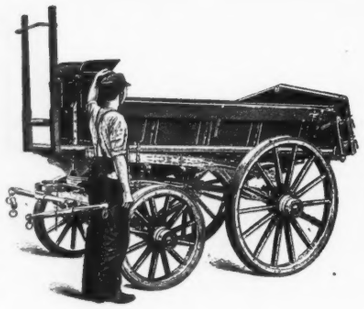


FIG. 3.

Figure 3 is a garbage wagon which has met health board requirements in being a sanitary wagon, perfectly water-tight, with covers, to render it as far as practicable odorless and so constructed as to be easily cleansed and at the same time have a wagon which would be profitatble to the contractor, inasmuch as on it he could carry a large load which could easily be drawn and at the same time tilt at such an angle as to cause the load to freely slide out.

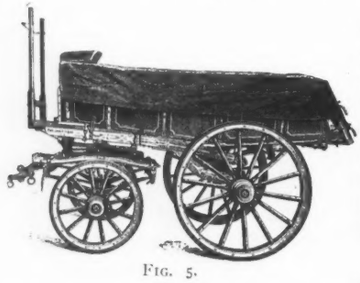


FIG. 5.

Bodies are furnished in wood or metal, but metal has not stood the corroding action of garbage as well as wood. Canvas covers (Figure 3) have been most successful in preventing odor, promoting cleanliness and easy handling, but hinged covers are supplied when desired.

Figure 6 shows a wagon with body tilted at an angle to allow contents *to run out slowly,* the amount at a time being controlled by a chain attached to body and tailboard, whereby a driver can distribute a load of sand, gravel or broken stone over a given area without leaving the wagon.

Figure 7 shows an asphalt wagon capable of carrying ninety hundredweight. It has been adopted by the large asphalt companies and pronounced by them the only successful attempt at a wagon for this purpose. It is lined with asbestos board on the bottom and sides one-quarter inch thick, and this asbestos covered with sheet steel; with this combination the heat is retained a long time in the asphalt, and the steel sides and bottom cause it to slide out freely. In this connection we would call attention to a device (see Figure 8) to raise the tailboard entirely free from the body. As all who carry asphalt know, it is frequently a difficult matter to release the tailboard after the asphalt has become set in the joint.

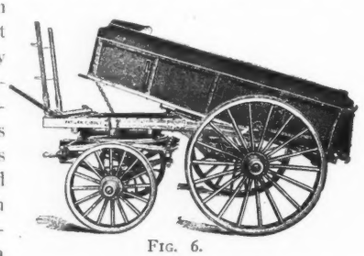


FIG. 6.

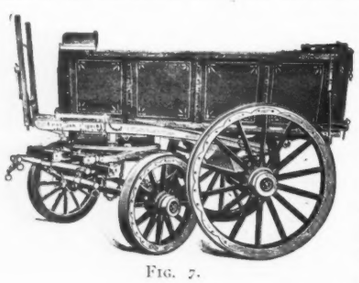


FIG. 7.

There are two rods fastened at the front end of frame side which rest on the frame when the wagon is in its normal position; when wagon is to be dumped these rods are connected with two short chains fastened on clevis at top of body at the back end, and as the body is tilted the distance between the frame and body is increased and the rods fastened to frame, drawing on the chains attached to clevis lift the tailboard, which automatically drops into position as the body is drawn back.

All these vehicles have body balanced on the hind springs, so that it is easily tilted without the use of any mechanism, the springs resting on a bar across the frame; this bar pivots in steel sockets and turns with the body. The sockets in which this bar turns are set in the frame sides at a point front of the rear axle sufficient to throw a proper proportion of the load on the front axle; this brings the centre of gravity about one foot back of a point between the axles, which practice has demonstrated is the proper distribution of a load over the two axles to secure the easiest draught with wheels of the relative height of those usually used.

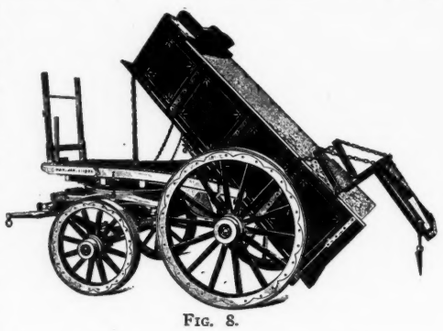


FIG. 8.

The springs are made with a double sweep so, as the weight in the body causes them to settle, the bearing on the springs comes nearer to the centre of the springs, thereby strengthening the springs and practically making a graduated spring which automatically is adapted to the weight to be carried.

PROPOSALS FOR ELECTRIC LIGHTING.

NOTICE:—The Board of Public Works of the City of Indianapolis, Indiana, invites proposals for furnishing of public, private and commercial electric lighting to the City of Indianapolis and its inhabitants, and for the letting of a franchise, if necessary, for the use of the streets, alleys and public places of said city for supplying such lighting, and will receive bids or proposals for the same on Monday, July 15, 1901, until 10 o'clock A. M.

A complete copy of the specifications governing such bids or proposals will be mailed on receipt of request by said Board.

ALBERT SAHM,
CHARLES MAGUIRE,
JOSEPH W. SMITH,
Board of Public Works,
Indianapolis, Ind.

PROPOSALS FOR WATER PIPE LINE.

Sealed proposals for the construction of a 20-inch cast iron force main, approximately 9,200 feet long, will be received by the City Clerk of the City of Lebanon, Penna., until 12 o'clock noon, Monday, July 1, 1901.

A certified check for 5 per cent. of amount must accompany each proposal. Blank forms and specifications will be furnished upon application to the Water Department, on and after Monday, June 24th, 1901. The right to reject any or all bids is reserved.

Attest:
J. D. KERR,
Secretary.

J. R. BECKLEY,
H. P. WEITZEL,
J. B. EMLICH.

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